



Major P. K. Gupta (Age 52 years).

MY SYSTEM OF PHYSICAL CULTURE TREATMENT

BY

Major P. K. GUPTA, A.I.R.O., I.M.S. (Retired),

Late adjutant Bengal Ambulance Corps ;

*Expert adviser to the student welfare committee,
Calcutta University ;*

*Expert adviser to the playground committee,
Calcutta Corporation.*

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DEDICATION

To

My Friend, Pupil and Patron.

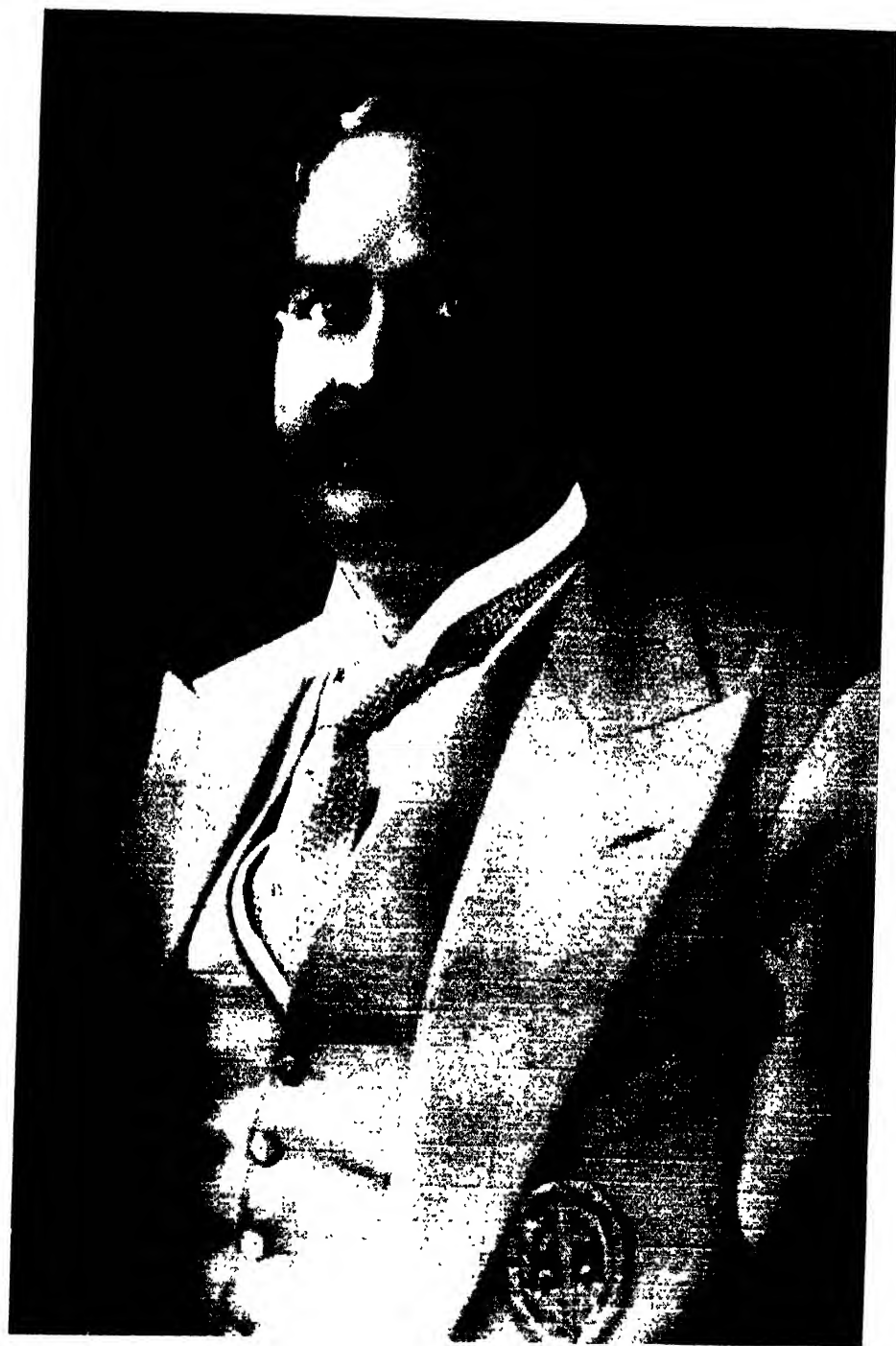
Sir Harisankar Paul, Kt., M.L.C.

My Dear Sir Harisankar,

In the galaxy of the commercial, landed and intellectual aristocracy of India no one feels more keenly than your worthy self the necessity of promoting the physical well-being of the youths of the land. Your belief in the fact that the mental, moral or even spiritual advance of a nation is not at all attainable unless it is accompanied with the physical progress of individuals, has prompted you all along to encourage me in my life long attempt to bring about a physical regeneration in the country, and to prove to the world that a very large percentage of physical and even mental ailments can be cured by the adoption of special courses of physical culture treatment which you have materially realized in your own life.

Sentiments of gratefulness for your championing a national cause so dear to me, and admiration for all that is noble and commendable in you, impel me to dedicate this humble work of mine to your great name. I fervently hope that you will be pleased to regard this act as a token of love and esteem of one who likes you for your candour, admires you for your genuine patriotism, and adores you for your nobility of character and unflinching devotion in the Divine Dispensation.

Yours affectionately,
P. K. GUPTA.



Sir Harisankar Paul, Kt., M.L.C.
An ardent pupil and admirer of the Author.

From Sir Harisankar Paul, Kt., M.I.C.

CALCUTTA

12th, January, 1936.

To Major P. K. Gupta.

My dear Major Gupta,

I must thank you for the kind interest you have taken to make me fit by your special system of Physical Training. I now possess a sound physique. In my own business sphere also in public life, my energy has increased some ten fold more than what I had before.

With best regards,

Yours affectionately,

Sd. Harisankar Paul.

PREFACE

The system of treatment by physical exercise has not been generally accepted by the medical practitioners in our country. Although there are some processes in the "Hatayogas" as practised by the Indian Yogees from time immemorial as a healing art, they are really getting obsolete due to two reasons firstly, those Yogees are secluded people who rarely come in contact with the mass; secondly, there is a common practice in an Indian, to part with 60% of his knowledge when teaching his student, retaining the other 40% reserve for his own, and the student in his turn would part with 60% of his knowledge to his pupil, and leave him to follow suit. So in the long run, after innumerable number of such subdivisions, the original knowledge instead of getting enriched, has been dwindled down to nothing. Again, what has been left in ancient Sanskrit literatures, bears different meanings as interpreted by different annotators. The main difficulty being that the Anatomical subdivisions of the human body and its Physiology as described by the ancient Hata-Yogees leave no analogy to the Ayurvedic system of treatment which is commonly practised by the Hindus in Hindusthan.

In this publication of mine which is based on modern Anatomy, Physiology and Pathology as accepted by the people of the western world, I have spared no pains in utilizing my experience as an athlete of about 40 years and a qualified medical man of 27 years while dealing with the treatment of the several ailments by physical exercise and regulation of diet. I hope this book will be of some service to the medical practitioners as well as people belonging to other departments of life.

I must express my hearty thanks to Dr. Brojendranath Ganguli, M.B., Editor "Sasthya" and Dr. Bhupatibhusan Ghosh, M.Sc., M.B. for their being so kind as to go through my manuscript, and help me with their valuable suggestions. Thanks also to my favourite pupils

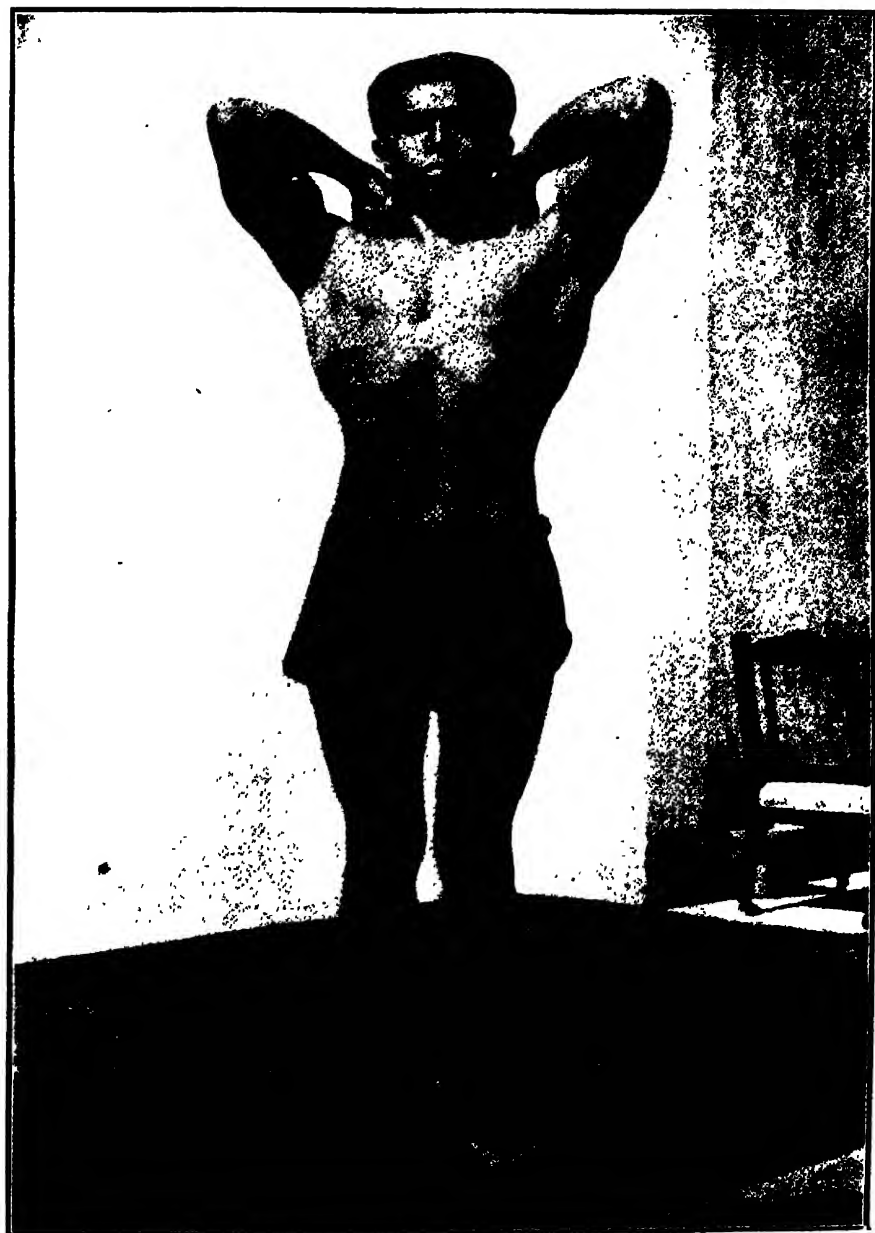
Mr. Digindra Nath Deb, B.A., B.L., Mr. Jadu Nath Banerjee, and late Mr. Kanai Lal Mukerjee (who recently met an accidental death) also my worthy nephew Mr. Nirmal Chandra Gupta, B.A. in helping me with their voluntary service by posing for the charts (for exercises) in this book.

My thanks are also due to those gentlemen (my patients) who have permitted me to put their portraits in this publication.

CALCUTTA

2nd February, 1936

PHANINDRA KRISHNA GUPTA.



(Late) Mr. Kanai Lal Mukerjee.

An well-beloved and ardent pupil of the Author. Most of the poses in this publication were supplied by him.



Mr. Jadu Nath Banerjee.

One of the Author's beloved pupils, has enriched this book with his fine poses



Mr. Nirmal Chandra Gupta, B.A.

An worthy nephew of the Author--has obliged the author by posing for all the figures illustrating the different forms of massages in this book.



Master Robindra Gupta.

The only son of the Author, (age 12 years), has performed the colossal task of taking all the photos for this publication.

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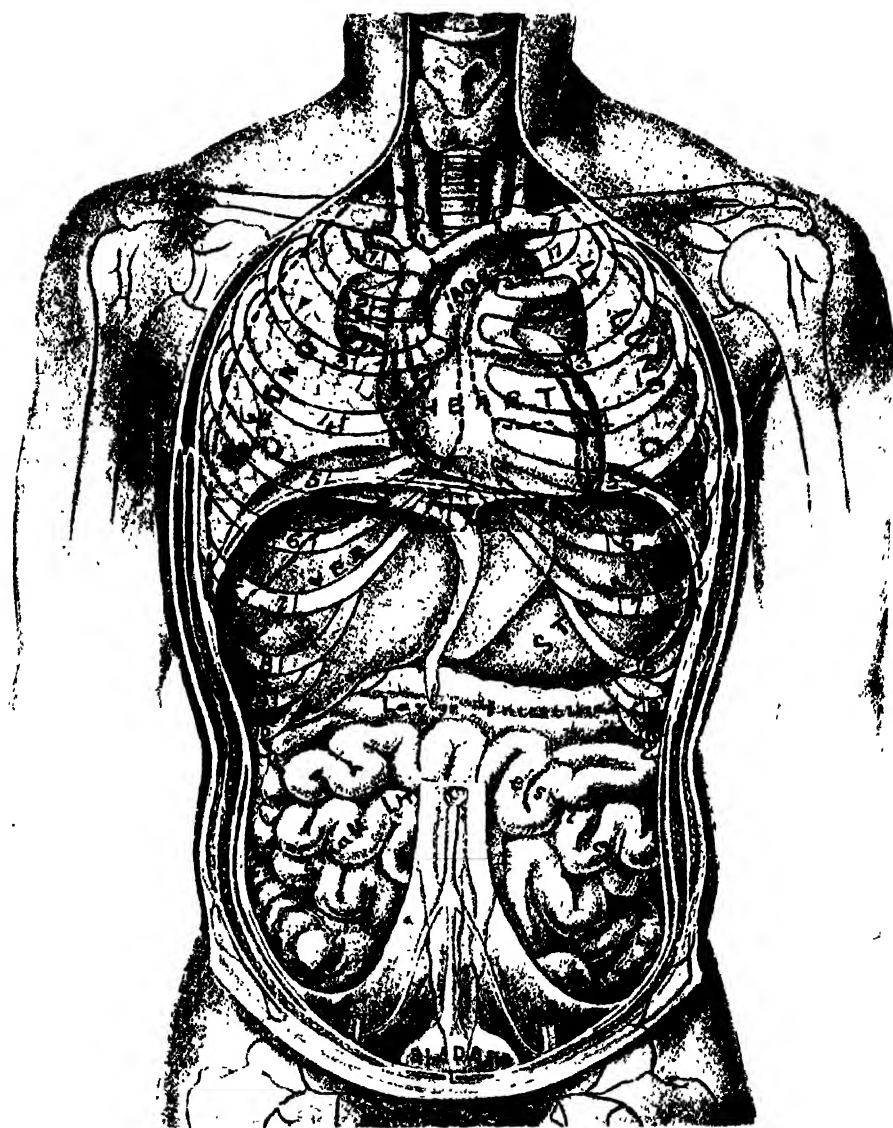
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The Thorax and the Abdomen exposed.

(Facing page 1)

INTRODUCTION

The condition when the different functions of all the organs of the human body are being performed in a normal way without any trouble or hitch is called **Health**.

A departure from Health is **Disease**.

Diseases may be local or general (constitutional).

Local Diseases are those in which some particular tissue or organ of the body such as the brain, the sole of the foot, the heart, the lung, or the liver is affected. While, in case of a general disease the whole system (the constitution) is upset.

During the life of the individual, Disease is manifested by **Symptoms**.

Symptoms are of two kinds (a) Subjective.

(b) Objective.

Subjective Symptoms are those that are detected by the patient such as pain, feeling of cold, itching or bruising.

Objective Symptoms are those that are detected by the physician, the observer, and these are such as dullness or resonance on percussion, and enlargement, hardness or softness of some internal organs of the body by palpation.

Objective Symptoms are usually called "Signs".

Symptoms again are local or general.

Local Symptoms are those lesions that are manifested at a certain part of the body or organ.

General or "**Constitutional**" **Symptoms** are those that concern the whole body. They are, e.g., rise of temperature of the body, headache, debility, etc.

Along with the Objective Symptoms, "Decubitus" that is the way in which the patient lies, the attitude, the gait, the expression of his face, the general conformation of the body also the colour of

the skin are those important factors that should always be noted by the Physician.

Aetiology :—It is the study of the causes of the Disease in general.

The causes of the Disease are usually divided into :—

(a) Predisposing.

(b) Exciting.

Predisposing Causes.—Heredity, constitution, age and sex stand as the causes predisposing a disease.

Heredity.—plays an important part in the causation of a Disease. Diseases such as Syphilis, Cerebral ataxy, Haemophilia, Colour blindness, etc., may be inherited directly from the parents. In several cases heredity decreases the power of resistance to certain diseases such as Tuberculosis, Rheumatism, etc.

Constitution.—People with strong constitution can keep pace with health, and seldom become victim to any disease.

Age.—There are diseases that affect people especially at a certain definite age. Measles, Whooping Cough, Diphtheria are very common in childhood. Rickets usually makes its appearance in a child during the first year. Again Emphysema, Arterio-Sclerosis, Senile Degeneration of the Cardiac Muscle occur in old age.

Susceptibility to certain kinds of injury or accidents is met with in different periods of life, *e.g.*, children usually get fractures during the period of 2 to 4 years of age. Fractures with separation of the Epiphysis of the long bones are commonly found before 10 or 12 years.

Fractures or dislocations are not so common in old people who naturally become slow and quiet natured, and do not usually expose themselves to accidents.

An accident that is usually met with in old people is the fracture of the neck of the Femur.

Sex.—Anatomical and physiological differences between the male and female have got a great influence to cause a special predisposition to a disease. The differences in the mode of life between the two sexes are also responsible to cause the predisposition.

Exciting Cause.—An exciting (External) cause is that which is one of a very short duration, and is just preceding the manifestation of symptoms.

One or the other of the following may be taken as an exciting cause of a disease.

1. Climate.
2. The Hygienic Condition under which the subject lives.
3. Exposure to cold or heat.
4. Trauma.
5. Infectious Disease.
6. Effects of poison.

Pathology.—It is the study of the physical condition of the structures of the body when they are diseased.

Morbid Anatomy.—It is the alteration in the structures of the body caused by disease.

Diagnosis.—It is the process of distinguishing one disease from another which may have more or less similar symptoms.

Prognosis.—It means the inference made by a careful study of the patient's condition :—

1. Whether he will recover or not.
2. If recovers, whether he will recover completely ; or be left with some organs or tissues of the body temporarily or permanently damaged.
3. Whether the disease will come on again "relapse" or not.
4. Lastly, if the disease be a fatal one, how long will the patient live.

Treatment.—It is the procedure by which the patient can be free from the attack and hold of the disease.

The first principle of treatment is "Removal of the cause".

There are three processes of treatment :—

1. Radical.
2. Symptomatic.
3. Preventive.

Radical (Curative) Treatment—is the process of removal of the cause. It is based chiefly upon a thorough study of the pathology of the disease.

Symptomatic Treatment—means treatment of disease by relieving the symptoms.

Preventive or Prophylactic Treatment.—It is the means of warding off the infectious diseases or external influences adverse to health, by following the dictates of Sanitary laws which are as a matter of fact based upon regulation of diet, clothing and so forth, also the employment of inoculation and vaccination in cases of certain diseases such as Cholera, Typhoid, Small Pox, etc.

Administration of drugs is not the only process to remove the cause and symptoms. But the following processes are also adopted when they are applicable and useful.

1. Diet.
2. Regulated Physical Exercise.
3. Massage.
4. Bath.
5. Application of Heat.
6. Electricity.
7. Organo-therapy.
8. Vaccination.
9. Anti-Toxic Serum. } Biological.
10. Non-specific.
11. Light.
12. X-Ray.
13. Diathermy.
14. Radium.
15. Surgical operation and its after treatment.

The first five items mentioned above are the processes that have been dealt with more or less in this publication. A few hints have been given here on Diet and Physical exercise. They have also been dealt with in a more comprehensive way in the latter chapters.

DIET

The quantity as well as the quality of the Diet prescribed for a patient should be carefully administered. A patient who takes no exercise, and even is laid up in bed wants food material though in much less quantity than persons taking active exercises. In gastric troubles and in febrile conditions, the patient should be given diet in small quantity, and in a very easily digestible form. In such conditions the diet should always be liquid, as the patient has not much power to masticate, consequently the saliva in the mouth is secreted in a very small quantity, and is quite insufficient to dilute the solid food taken in.

The quality of diet should be very carefully looked into. In certain diseases the carbo-hydrate elements in the food should be spared very carefully, such as in Diabetes. While in some cases the protein should be restricted, as in a case of Gout or Rheumatism.

Again in certain conditions such as acute Gastric troubles, the administration of diet through the mouth has to be stopped, and it is given per rectum.

REGULATED PHYSICAL EXERCISE

The exercises that are prescribed for the treatment of a disease, should be well regulated and supervised by an expert massuer and gymnast. The gymnast should not only be an expert in his own art, but he must also have a thorough medical and surgical knowledge.

In cases of troubles in the joints, or in certain diseases of the nervous and the endocrine systems, no active resistance exercise should be attempted by the patient himself before he is given some passive exercises, *i.e.*, passive movements and manipulations performed by the massuer for some reasonable period. These courses of passive movements help to increase the circulation, facilitate the freedom of movements of the joints, and give a sort of encouragement and stimulus to the patient for the future active resistance exercises to be performed by him. When the patient is to go in for active movements of the limbs, or do some determined muscular movements, he should try to put his will-power accurately into the muscle or muscles concerned in the act of movements that are to be performed. Again it is the duty of the massuer to point out as well as to try to convince the patient the utility of directing his will-power to those muscles.

Both in cases of active and passive exercises the movements should be very slow (usually one movement in one second), and the number of movements be gradually increased. In case of an active exercise also in resistance exercises care should always be taken to avoid fatigue.

MASSAGE

It is a sort of manoeuvre performed by manipulations of the patient's limb or limbs and the soft tissues by a massuer (operator) in such a way as to assist the circulation of blood and lymph in the part of the body massaged, and give a sort of stimulus to metabolism. It restores tone to the tissues, stimulates and soothes the nervous system which is usually effected by active exercises in the healthy subjects. By proper massage adhesions in a joint are removed, and the joint is made useful for future movements. Vigorous massage causes blood supply to the muscle or muscles about three times of that which is supplied in normal conditions. It makes them vigorous, and increases the skin reflexes.

As a rule the patient should never stiffen or contract the respective muscle or muscles while undergoing the massage.

Types of massage that are employed in general practice :—

1. Friction.
2. Effleurage.
3. Kneading.
4. Pinching.
5. Foulage.
6. Tapotement.
7. Flagellation.
8. Vibration.

1. **Friction.**—It is a sort of linear or circular movements performed by the tips of the fingers, the thumb or a small portion of the palm of the hand with the application of pressure of a varying degree. It is usually applied along the course of nerves, and in abdominal cases over the area of the Intestines.

Friction is used to remove superfluous fats from the fatty tissues, also thickenings and adhesions in chronic inflammations, by absorption of the inflammatory products, and help nutrition.



Figure A.

Figure B.

Effleurage applied on the upper limb Figs. A and B.

2. **Effleurage.**—It is a sort of stroking movements performed by the whole surface of the hand with varying amount of pressure, usually very light, and is applied from the distal to the proximal side of the limbs, also along the course of the venous and lymphatic circulations.

It is usually applied to get rid of the waste materials resulting from the katabolic process of the body, thereby removing fatigue and helping the absorption and elimination of serous fluids.



Kneading the upper arm.



Kneading the buttocks.

3. **Kneading.**—This is a sort of circular movements usually applied in an upward (towards the heart in case of a limb) direction with pressure of the hand or hands on the underlying parts intermittently while one hand is used, and alternately when both hands are employed, just as the handling of the dough in the process of bread making.

Wringing :—It is a sort of Kneading usually employed on the extremities. The pressure is given with the hand or hands enclosing the limb.



Wringing.



Pinching.



Foulage.

4. **Pinching.**—It is employed on the skin also the muscles underneath. The manoeuvre starts from the centre towards the periphery, or sometimes centrally at a fixed point on the muscle to be dealt with. The pressure should be moderate so as not to cause pain.

5. **Foulage.**—It is a sort of oval or circular pressure pretty deeply applied by the tips of the fingers.

6. **Tapotement.**—It is a sort of percussion which is given with the tips of the fingers, the palmer surface of the hand or hands, or the whole hand hollowed so as to enclose some air between it and the surface of the part which is to be massaged. This process should be done for 5 to 15 minutes at a time. It may be done in three or four sittings, or as many sittings as required.

There are several kinds of Tapotements that are usually applied.

- (a) Beating.
- (b) Hacking.
- (c) Clapping.
- (d) Pounding.



Beating.

- (a) **Beating.**—The fingers are flexed pretty loosely against the hand, and the wrist is kept elastic. While

applying the strokes the entire hand is made to fall intermittently just like small hammerings.



Hacking.

(b) **Hacking.**—It is a form of light tapping the part with the tips of the fingers of both hands falling alternately.



Clapping.



Clapping.

(c) **Clapping.**—It is stroking the part with the whole flat (the palmer surface) of the hand just like the

clapping of hands. It is usually applied intermittently, sometimes both hands are used alternately.



Pounding.

(d) **Pounding.**—It is the combination of both Hacking and Beating. It is practically a sort of strong Tapotement.



Flagellation (Start).



Flagellation (Finish).

7. Flagellation.—It is striking the affected part of the patient with a wet towel or handkerchief.

8. **Vibration.**—It is usually applied by the tips of the fingers on the affected part of the patient. The muscles of the forearm are kept in a contracted condition, while movements of a fine vibration type are given along the course of the nerves to soothe them. Coarse vibrations are often applied in cases of abdominal massage to stimulate the abdominal viscera.

Massage is usually divided under five headings as applied on the different parts of the body.

1. Massage of the Lower Extremity.
2. " " Upper Extremity.
3. " " Head and Neck.
4. " " Trunk.
5. " " Abdomen.

Massage of the Lower Extremity.



Fig. A.—Starting at the groin.

1. **Massage of the Lower Extremity.**—When massaging the Lower Extremity special position should be adopted to accommodate the lower limb in cases of fracture or dislocation of the said limb, as it has been described under the headings of those special troubles. The process of massage should be started from the

groin, applied towards the periphery down to the ankle, and finally finished back at the groin. The course of the Long Saphenous



Fig. B.—Proceeding downwards towards the knee.



Fig. C.—Down the knee, backwards to the calf muscles.



Fig. D.—Proceeding downwards, to be finished at the front of the ankle joint.

vein should be followed very carefully, as this is a common site for venous thrombosis ; and careless handling of the part may

cause dislodgement of the thrombus, which is a dangerous condition.

Massage of the Upper Extremity.



Fig. A.—Starting from the shoulder, keeping the thumb of both hands on the Deltoid muscle.



Fig. B.—Proceeding downwards, reaching the back of the forearm.

2. **Massage of the Upper Extremity.**—Special positions are recommended under special diseases. But in the ordinary condition the patient's arm may be kept extended, and the palm of his hand resting on the massuer's shoulder. The left hand of the patient rests on the right shoulder of the massuer, and the right hand on the left shoulder. The patient may grip the front part of the massuer's waist-belt with his left or right hand when he will get his respective arm massaged. For the whole arm and the forearm pressure should be applied starting from the shoulder, proceeding down to the wrist, and back to the region of the Deltoid



Fig. C.—Down to the wrist. The tips of the thumbs reaching the front of the wrist-joint.

muscle. Care should be taken to apply moderate pressure on the vessels at the inner side of the upper arm.

3. **Massage of the Head and Neck.**—It is usually applied in cases of Neuralgia or pain in the muscles of the neck, or the head ("the Scalp"). The patient sits on a chair having a straight back rest. The massuer stands behind the patient. Light strokes of *offleurage* like scratchings (Fig. A.) are given all over the scalp, and then the hairs are held in bunches under the grips of the fingers (Fig. B.), also moderate twists are given on their roots. Now the scalp is given a sort of slow rubbing with moderate pressure, using the tips of the fingers. Then alternately with the fingers of both hands the forehead is massaged (Fig. C.); the pressure being applied from the forehead along the temple as far as the occiput, and back to the forehead again. The manoeuvre is finished with application of a few pinchings on the nape of the neck from above downwards with a vibratory

Massage of the Head.



Fig. A.—Light strokes of effleurage being given to the scalp.



Fig. B.—Hairs are held in bunches under the grips of the fingers, and are twisted.



Fig. C.—Pressure applied to the forehead along the temple.

movement of the hand. This procedure often relieves persistent Neuralgia of the scalp, the forehead and the temple.

During massage of the neck proper, the patient sits on a chair, and leaning forwards rests his head on some support of a suitable type, placed at a suitable level. The massuer stands behind him, and employs both hands to start the manoeuvre, he applies tapotement alternately to the right side of the neck with his right hand, and the left side with the left. Starting from the occiput, he carries the pressure downwards along the sides of the neck right and left with the corresponding hands of his own. Last of all he gives some smart pinchings on the nape of the neck from above downwards to finish the show. Neuralgia and pain in the muscles of the neck are much relieved by this neck massage.

Massage of the Neck



Fig. A.—Tapotement given alternately to the sides of the neck.



Fig. B.—Tapotement given simultaneously to the sides of the neck.



Fig. C.—Smart pinchings given to the nape of the neck from above downwards.

4. Trunk Massage.—This consists of massage of the Chest, Back and the Abdomen.

Chest Massage.



Fig. A.—Starting from below the clavicles, and proceeding downwards and outwards.



Fig. B.—Proceeding downwards and outwards, and reaching the 11th rib on each side.



Fig. C.—Massaging the chest (Right side) proceeding downwards and outwards—towards the 11th rib right side.



Fig. D.—Massaging the chest (Left side) proceeding downwards and outwards—towards the 11th rib left side.

Chest Massage.—It is applied in cases of pain in the Pectoral and the Intercostal muscles. The patient sits erect, stretching his legs in front, and resting his hands on the ground. The massuer in massaging both the Pectorals and the Intercostals should stand behind, resting both his knees on the back of the patient as shown in Figs. A and B. Now with both hands he applies effleurage followed by moderate kneadings and tapotements of the Pectoral muscles and the intercostals. The pressure should be started from below the clavicles downwards and outwards as far as the lower margin of the 11th rib on either side, then keeping the pressure mostly on the tips of the four fingers and the outer half of the palms of both hands, carries the pressure back to the original starting place below the clavicles. In cases associated with heart-troubles or high blood-pressure, the patient sits on the floor as shown in the figures.

The massage should be done by the massuer first on the right and then on the left side. While massaging the right side of the patient's chest, Fig. C the massuer should stand on the left, and place his right hand on the back of the patient, preferably on the latter's left shoulder ; keeping the lightest weight possible. He gives effleurage with his left hand on the right chest ; starting from below the right clavicle down and outwards till the tips of his fingers reach the lower margin of the 11th rib right side, then carrying the pressure back slowly and lightly towards the right clavicle. The left side of the chest should be massaged in a similar manner by standing on the right side of the patient Fig. D and using the right hand for the massage, also keeping the left hand on the right shoulder of the patient.

Back Massage.



Fig. A.—Starting from the spinous process of the 6th cervical vertebra, proceeding down and outwards, passing the lower angle of the right scapula and reaching the 11th rib of the same side.



Fig. B—Similar process (as applied on the right side) is being applied on the back (left side).

Back Massage.—In cases of pain in the back muscles and in Arthritis of the spine, the position of the patient should be similar

to that described under the heading of pain of the chest muscles. To massage the right side, the massuer stands by the left side of the patient, Fig. A resting his left hand on the patient's left shoulder, and starts tapotement with his right hand from the spinous process of the 6th cervical vertebra straight down the spine for about four inches, and then round the lower angle of the scapula to the right side of the chest over the 9th, 10th and 11th ribs ; he carries his hand with moderate pressure back to the starting point. When massaging the left side of the patient, the massuer should naturally reverse the position, Fig. B but follow a similar process. Finally, he should apply some frictions with moderate pressure straight down the spine.

While massaging the Loins, the patient turns his face on a soft and comfortable bed. The massage over the loins is done by friction with moderate pressure which is given sideways. Hacking over the Lumber region of the spine is done, also beating applied on the glutii muscles.

Abdominal Massage.



Abdominal kneading.

Abdominal Massage.—The patient lies on his back on a sofa or on a soft bed with a medium sized pillow under his head and shoulders, also the knees slightly raised, and bent. In abdominal

massage light strokings, vibrations, also careful kneadings are applied. For the liver kneading, stroking, hacking and beating are necessary.

For the Intestines stroking, friction, and kneading are useful.

In cases where the patient is suffering from high Blood-pressure or Valvular Diseases of the heart, massage of the abdomen should be done very lightly ; otherwise the patient may contract his abdominal muscles, fix the Diaphragm, and thereby constricting its Crura, suffer from obstruction of the flow of blood through the Vena Cava.

BATH

Water furnishes the function of bathing the body both internally and externally.

Internally.—It acts as a powerful solvent. This is manifested in a patient who feels unusually thirsty when he is suffering from Diabetes, when he is attacked by some infective fever, or when there is some inflammatory condition present in his system.

The blood in health has got a certain specific gravity (1030... 1075), which is changed from time to time due to its physical loss of the fluid constituents by the normal excretions as urine, perspiration and other secretions. It also gets thickened by the formation of an excessive amount of toxin (unwanted impurities) when there is an inflammatory condition inside, or an infection from outside the system. When thus thickened, the blood tries to imbibe more water into the system in order to assume its normal specific gravity, and to keep the solid toxin or toxins in solution ; and thereby making the system able to get rid of the toxin easily through the excretory systems. This function of elimination of the toxin indirectly helps digestion. Sufficient intake of water keeps the contents of the bowels moist, and removes constipation.

Externally.—In the form of the many different kinds of baths water removes dirt, cleans and invigorates the skin, also does a lot of good to the tissues underneath ; and thereby, it not only keeps the

body in a healthy condition, but helps to cure several diseases when administered systematically and carefully.

Baths are of various kinds.

The different kinds of baths are as follows :—

1. Water bath.
2. Vapour bath.
3. Sand bath.
4. Sun bath.

Water Baths.—Various kinds of water baths are used, such as :—

- (a) Indifferent bath.
- (b) Cold bath.
- (c) Hot bath.
- (d) Warm bath.
- (e) Turkish bath.

To these may be added the medicated water-baths :—

- (f) Sitz bath.
- (g) Mag. Sulph. bath.
- (h) Alternate hot and cold foot-bath.

Indifferent bath.—It is neither hot nor cold. The temperature of the water of the bath varies from 88° F to 98° F. The utility of this bath is to cleanse the body by immersing it in hot water which keeps almost the body temperature for a long time, without affecting the temperature of the body.

Cold bath.—A healthy man feels it cold. The temperature of the bath ranges from 32° F to 60° F. If a man remains inside this bath for a short time, and the temperature of the water be not very cold, the body heat is not very markedly changed. Because the production of the heat caused by the chemical changes in the body balances the loss. But if the same bath be prolonged, the body actually loses its warmth. A short cold bath causes an increased activity of the tissues, and removal of the waste products from the internal organs, causing contraction of the cutaneous vessels.

A cold bath may be indulged in, by a man with sound heart, throughout the year. In winter, the duration should never be more than two to three minutes. In hot weather, no harm is done if it is taken for ten to fifteen minutes. In cold weather, after severe athletic exercises a cold bath should be taken as soon as the respiration has become normal; never mind if there be any perspiration, or if the body be glowing with it. Never allow much time to get the body cooled down completely. Immediately after a cold bath a pleasant feeling of warmth is felt all over the body, and that is a sign of good health. During hot weather, allow certain time to lapse after the respiration has come down to normal, the skin has cooled down, and all the perspiration dried up.

People who are very much advanced in age, also people with unsound heart and lungs should by no means attempt an outdoor bath, or a cold bath at home.

Regular cold bath is a very good practice, and is also beneficial to people in normal health, as it helps in training the capillaries to contract and dilate alternately, and makes the habitual bathers free from the susceptibility to cold.

Hot bath.—The temperature of the bath ranges from 100° F. to 110° F.

Warm bath.—The temperature of the bath may range from 98° F. to 99° F. It imparts heat to the body, increases the body heat, and prevents the loss of heat from it.

Turkish bath.—This is a sort of warm bath. The process is practically passing a longer or a shorter period in a room at temperature ranging from 100° F. to 200° F. When undergoing a turkish bath, the action of the skin is vigorously encouraged. The body is cleansed with soap and friction, and gradually hardened by spraying of water starting from hot to cold, followed by a cold plunge, and then resting in a cold room.

Bath should never be attempted immediately after a full meal or thorough exhaustion.

Massaging the body with oil before a bath is very stimulating. It dissolves the dirt at the roots of the hairs, and softens the skin.

For an Athlete.—After exercise a cold bath is very refreshing. It is a very good practice to massage the body after exercise and immediately before the cold bath which is to follow, as it is very stimulating and refreshing.

Medicated Water bath :—

Sitz Bath.—It is used when the lower abdominal organs require to be toned up by stimulating the local circulation. It is very useful in piles.

Process.—The patient sits in a bath-tub containing tepid water for a period of five minutes, with his feet outside the bath, and the water inside the bath reaches up to his naval. The upper part of the body is well covered. He then comes out of the bath after the required period, and gets a thorough friction of the whole body with a dry towel.

Mag. Sulph. Bath.—This is required in cases of rheumatic troubles, etc. The patient remains for about ten minutes in a bath of hot water in which 2 or 3 lbs. of Mag. Sulph. have been dissolved. During the period he is in the bath, the patient rubs the whole body with his hands. After a period of about ten minutes he gets out of the bath, washes the body with tepid water, and the whole body is rubbed down with a dry towel.

Alternate Hot and Cold Foot-Bath.—It encourages sleep.

Vapour Bath.—It serves the purpose of a warm bath, and if prolonged, it works like a hot bath. Its utility is manifested in many medical treatments as in cases of common Cold, Bronchitis, Influenza, Lumbago, Sciatica, etc.

Sand Bath.—It is a sort of lightly rubbing the dry sand all over the body, and dusting them off after some time. The sand used for this purpose should be sterilised by being exposed to the hot Sun, or heated over a furnace, and kept for some time before it is used as a bath.

Sun Bath.—The theory that the Earth has originated from the Sun, reiterates the truth that the existence or the transpiration of any and every sort of life on the surface of the Earth depends respectively upon the contact with or isolation from the Sun's rays. So far almost all the living existence live and thrive under the Sun's rays. There are some organisms that live and thrive away from the Sun's rays, and the direct rays from the Sun kill them. Most of the microscopic organisms, the bacilli and the bacteria, that infest the animal and the vegetable kingdoms, are devitalized or killed by direct exposure to the Sun's rays for a certain length of time and intensity. So by exposure to the Sun's rays several skin diseases are cured.

The medical world by recent discoveries about Sunshine have opened up vast realms in the relief and cure of diseases also their preventions. The invisible rays known as Infra-red and Ultra-violet rays emit energy deep into the tissues of the body, stimulating and vitalising the blood corpuscles, toning the nerve cells and the nerve centres ; also allaying pain, and by removing weakness, impart radiant vigour to the body and the mind.

In the East and especially among the Indians, there has been a custom to give massage to the newly born babies with oil, and place them in the Sun for some hours in the morning every day. It is a very good practice in making those youngsters develop immunity against cold, and tone up their nervous system. In the long run it makes them fit to expose themselves to the inclement weathers, and enables them to fight out the great battle of life.

APPLICATION OF HEAT

It locally stimulates the part on which the heat is applied. It improves the local circulation, and thereby relieves the congestion, and renders a soothing effect.

ELECTRICITY

This is used in the treatment of certain nervous derangements and paralysis. In certain conditions where the muscles which

cannot be contracted by the will of the patient, application of electric currents will cause the contraction by stimulating the nervous mechanism of the muscles or the individual muscle fibre, if those muscles have not undergone any atrophic change. The contraction of muscles can be effected by the continuous or the faradic current.

In cases of Neuralgia, the local pain can be reduced, or even removed by application of a continuous current of electricity.

ORGANOTHERAPY

It is a treatment with the extracts of various animal glands such as Thyroid, Suprarenal, Pituitary, etc., effected by means of oral administration, or hypodermic injections. It is done with the idea to supply the deficiency in the corresponding glands of the human body. In chronic cases different glands are transplanted on diseased persons.

VACCINATION

It means ingestion into the system, of a solution containing several millions of dead bacteria of the same species by which the patient is attacked. These dead bacteria being injected into the system of the patient, cause an increase in the "Opsonic Index" (Resisting Power) of his blood, and thereby make him able to fight out the invasion caused by the bacteria.

ANTI-TOXIC SERUM

It consists of an injection into the system of a patient with serum of an animal which has been previously rendered immune to that particular disease by producing a severe type of the same disease. This serum contains anti-bodies which will neutralize that special disease with which the patient is suffering. The sera may be injected subcutaneously into the muscles, the veins or the thica of the spinal column as required.

LIGHT

Exposure to light, especially dry sunlight, has a special beneficial effect in curing diseases. Application of artificial light

such as "Finsen" light rays have a good reputation in the treatment of Rodent Ulcer or Lupus. This light is produced by an Arch light from which the heat rays have been cut off.

XRAY

It is used in the treatment of cancer, enlarged glands, splenic Leukaemia, etc.

DIATHERMY

In this, the heat applied, penetrates more deeply into the tissues with graduated intensity than the ordinary heat applications. It is used in cases of joint affections very frequently.

RADIUM

It is used in cases of Cancers deeply situated in the body, and which cannot be easily reached for surgical operations.

SURGICAL OPERATIONS

Experts should be consulted where necessary.

INFECTION

By infection is meant the access of living pathogenic bacteria of great virulency into certain part of the body where the bacteria multiply, and the toxin produced by them gets absorbed, and acts directly on the tissues.

The gravity of the infection depends upon the virulency of the organism, and in this respect different types of bacteria differ greatly from one another. The virulency also depends on the power of resistance of the person infected. Organisms of the same variety sometimes differ in their virulency. Some of them retain greater virulency than others living under different conditions, *e.g.*, a slight wound infected by streptococcus from a septic peritonitis is much more dangerous than a streptococcic infection from an ordinary septic tonsillitis.

An infection is effective when the subject is susceptible to it, and the susceptibility is increased when the system of the patient is sufficiently depressed.

The organisms must be pathogenic, otherwise there may not be any infection at all, *e.g.*, normally there are plenty of Diphtheria bacilli to be found in the mouth without producing any harmful effect.

- Infections are of two kinds :—1. Specific.
2. Non-specific.

Specific Infection is one which is produced by the attack of one special type of organism alone, *e.g.*, Bacillus Tetanus, Hydrophobia, Syphilis.

Non-Specific Infection is one in which the infection may be caused by a number of different kinds of bacteria.

- Infection again is divided into :—1. Infection proper.
2. Contagion and Infection.

Infection proper is one where there is no direct or indirect contact with the source of infection, as in the case of Influenza or Pneumonia, etc.

A disease is said to be contagious, when the infection is conveyed from one to the other or more subjects, by direct physical contact as by shaking hands with a Scabies patient, or indirectly as by putting on dirty clothes already used by the same patient. Similar example is the case of an infection by Syphilis. It may be a direct infection from one person to the other by physical contact, or indirectly as by drinking water from an infected cup, or smoking an infected pipe.

IMMUNITY

Nature has bestowed a sort of power of resistance upon every living animal which is always exposed to some infection, the source of which is the existence of bacteria in our food, or drink and the air we breathe. The bacteria are also present in our alimentary canal and on our skin.

Animals develop this resisting power against bacteria by being exposed to the infective sources. This power of resistance is called "IMMUNITY". Animals not having this natural power of resistance are called "susceptible," *i.e.*, they naturally yield to the attack of these bacterial invasions.

Immunity are of two types :—

1. Natural Immunity.
2. Acquired Immunity.

Natural Immunity.—Is that power of resistance (against bacteria) which the animal possesses since its birth, and not developing in its life time.

There is no absolute standard of immunity, *e.g.*, if certain number of animals are inoculated with equal doses of a special type of bacterial culture, some may show no sign of any ill effect, others may be moderately affected. Again some may be very seriously affected by the inoculation.

Immunity to a certain special bacteria is not fixed. It varies and depends a great lot upon the time and condition. A man may be very strong physically, and is supposed to be immune to tubercle bacillus, but at a certain time if that very same man's vitality is lowered, his immunity to tubercle is decreased, and he becomes susceptible to the bacillus very easily.

This lowering of vitality depends upon causes which are local and general.

Local Causes :—

- (a) Injury such as contusions, bruise, burns, or irritation caused by the application of some chemical substances.
- (b) The application of some too strong anti-septics also lowers the local vitality of a wound, and helps the access of pyogenic organisms into it.
- (c) Deficiency of blood supply to a part lowers the vitality of the local tissues, and renders the part susceptible to infection.

General Causes :—

- (a) Starvation.
- (b) Residence in vitiated atmosphere and in damp also un-hygienic conditions causes malnutrition, and reduces the power of immunity.
- (c) Continual use of some poisons such as Alcohol, lowers the vitality.
- (d) Haemorrhage increases the susceptibility to infection.

Acquired Immunity.—It is that power of resistance developing in a subject during his life time.

Acquired Immunity are of two types :—

- 1. Active Immunity.
- 2. Passive Immunity.

Active Immunity.—It is obtained by a person who has once suffered from the attack by some special infective organism.

Passive Immunity.—It is the type of immunity which is acquired by injection of the serum of an animal that has already acquired immunity by injection of a special organism.

The theories of immunity and anti-toxin serum are not discussed elaborately here, as it is not the particular province of this book.

INFLAMMATION

It is the series of changes in a living tissue after it has been injured. These changes are not strictly pathological so long as the degree of the injury is not sufficient enough to cause destruction of the structure and the physiological functions of the tissue involved.

Usually inflammation is the nature's protective or conservative procedure to limiting the advance of septic or other pathological bacteria, and eventually removing them from the system, also effecting complete resolution as evidenced in case of healing of wounds. But if the bacteria be much virulent in character, and the tissue vitality at the same time is lowered, the inflammation may give way to sepsis, or other disastrous pathological changes in the tissues attacked.

Inflammation may be, —

1. Acute.
2. Chronic.

Acute Inflammation.—It is the type of inflammation which runs a rapid course, and is associated with many severe symptoms.

Causes.—Irritation of tissues produced by :—

- (a) Heat, *e.g.*, burns or scalds.
- (b) Mechanical injuries, such as blows, pressures or sprains.
- (c) Irritating chemicals, such as strong mineral acids or alkalies.
- (d) Electric currents, *e.g.*, lightning, strong currents as employed to cause illumination, or treat diseases by means of X' Rays, Ultra-violet rays, etc.
- (e) Some special bacterial invasion.

Signs and Symptoms of Inflammation.—The four cardinal symptoms of inflammation are,—

1. Heat.
2. Redness.
3. Swelling.
4. Pain.

To these a fifth sign may be added, and that is "Impairment of function".

Heat.—The inflamed part is hot to the touch, the surface temperature of the spot is distinctly raised above that of the surrounding skin. This is due to the increased amount of blood flowing through it. As a matter of fact some active chemical and pathological changes are taking place in an inflamed tissue, and necessarily certain amount of heat is produced.

Redness.—The inflamed part becomes full of blood, so naturally certain amount of congestion is produced locally, causing redness. The colour is bright red or rosy red. If pressure is applied, the redness disappears, but it returns very quickly. In this condition the local circulation is comparatively free ; so the redness disappears,

and returns again. But when there is stasis, and thrombosis formed, pressure does not elicit that change, and the redness becomes more or less permanent.

Swelling.—This is caused by congestion of blood and exudation of serum in the inflamed part.

Pain.—This is due to the mechanical irritation of the local peripheral nerve terminals. This irritation is produced by the pressure of blood in the local arteries, and the exudation. Again the direct chemical action of the exudation on the peripheral nerve endings is responsible in some respect to cause the pain.

Impairment of Function.—This is due to the abnormal swelling of the part involved, which mechanically obstructs the movement of the part. This is also due to the paralysing effect of the inflammatory process on the muscles which cause the movement.

Constitutional Symptoms of Inflammation.—These depend a great lot upon the condition of the tissue involved, and the cause of the inflammation. If the organ like the hand is inflamed, the case may not be severe ; but if the heart or the kidney is involved, serious constitutional symptoms are manifested.

As regards the causes, if the inflammation be due to trauma, and there is no bacterial infection, there may be temporary rise of temperature which may be due to the action of fibrin-ferment—(fibrin fever).

When there is an inflammation due to some pyogenic origin, there will be pronounced fever. There may be other serious constitutional symptoms manifested also, *e.g.*, if there be found a few drops of pus present under the palm of the hand, severe pain and constitutional trouble make their appearance.

Again when there is a severe infection by some virulent germs such as Tetanus, etc., very severe and dangerous symptoms manifest themselves.

Morbid Changes in Acute Inflammation.—

Dilatation.—There occurs dilatation of the blood vessels with acceleration of the current of blood in the small arteries, capillaries and veins. This rapidity of the blood flow lasts for a while, and then the flow becomes slower and slower; and finally it may go on to "**Stasis**," or stand still.

Retardation.—During this condition intra-vascular congestion even regular thrombosis may occur. This driving force from behind continues unaltered, and there occurs no contraction of arterioles.

Soon after the dilatation of the blood vessels, the Leucocytes begin to collect along the periaxial inert layers of the veins. It seems as if those Leucocytes fall out of rank like soldiers falling out during a march. This process soon becomes marked in all the vessels. The red blood corpuscles follow similar course. They begin to adhere to each other (running into Rouleaux) and to the side of the vessel wall.

Exudation.—Then comes on another change. The Leucocytes that have adhered to the inner layer of the veins become sticky. Some alteration takes place in the condition of the vessel walls which become permeable; and these Leucocytes now pass through the walls of these vessels.

Due to mechanical pressure caused by an acute congestion, the red blood corpuscles in the highly inflamed area exude out through the capillary vessel walls.

Exudation of Liquor Sanguinis also takes place. This is as a matter of fact an exaggeration of the normal process of transudation, which the lymphatics of an inflamed area cannot cope with. When the fluid escapes into the tissues, it comes in contact with the breaking down Leucocytes, and undergoes coagulation. In this way inflammatory lymph is locally formed. The serum collects inside the tissue interstices, and inflammatory oedema is formed. If the surface is broken, the serum oozes out,

After passing into the peri-vascular tissue (connective tissue outside the vessel through which the blood is flowing), various changes take place in the exuded fluid. The white blood corpuscles may die, get at once disintegrated, and fibrin-ferment is set free. It may find its way back into the circulation through the lymphatic system. The business of the white blood corpuscles is just like the advance-guards of the first line of defence to fight the infecting bacteria, dislodge them like the field ambulance personnel, and finally remove like scavengers the dead tissues which exist in the neighbourhood. This operation is best observed in the case of bacterial infection of a tissue causing local inflammation, where these big sized white blood corpuscles "Phagocytes" wade through the congested region, swallow these bacteria and any dead tissue or blood corpuscles left in the vicinity. This action is called "Phagocytosis." But when they cannot cope with the rush of the fight, several of these white blood corpuscles die, they are formed into pus cells, and finally get devoured by other phagocytes. This sort of pus formation only takes place in an inflammation due to some bacterial infection.

Types of Inflammation :—

1. Catarrhal.
2. Diphtheritic.
3. Croupous.
4. Paranchymatous.
5. Metastatic.

Catarrhal Inflammation—Is the type of inflammation which affects the mucous membranes. It is caused by bacterial infection or the action of some local irritants. There is an active inflammatory change associated with hyperaemia, swelling and exudation. At first the mucous surface becomes dry, red and painful with burning sensation ; gradually there occurs free secretion of mucous and pus. The superficial epithelium is lost in certain areas or sometimes in the whole of the inflamed surface of the mucous membrane, and ulcers are formed.

Diphtheritic Inflammation.—Is due to the infection of *Diphtheria bacillus* on a free mucous surface. There is formed a comparatively tough layer of plastic membrane. It is formed by coagulation of the extravasated plasma, plus certain amount of the locally necrosed tissues.

Croupous or Plastic Inflammation.—In this there is formation of a firm false membrane caused by coagulation of the plasma and the deposition of the fibrin exuded from the vessels. In ordinary mucous membranes, such as that of the Pharynx, it forms a white membrane which can be easily detached without any loss of substance of the mucous membrane. But in case of the inflammation of serous membranes, *e.g.*, in pleurisy or peritonites, it produces a layer of plastic lymph which usually gets organised in the adhesions of the two opposite layers of membranes.

Parachymatous Inflammation.—Is the inflammation which is limited to the actual substance of the organ inflamed.

Metastatic Inflammation.—Is that sort of inflammation of certain gland substances such as the testis, ovary or the mammary glands, following an attack of mumps, in which the infection is carried from one gland to the other through the blood circulation.

Termination of Inflammation :—

Resolution.—That is absorption of the inflammatory material. The tissues that have been affected, begin to become normal. The blood vessels that were dilated, during the time of resolution contract to their normal size ; and the adhesiveness of the corpuscles gradually disappears. The exudation of serum and influx of the white blood corpuscles as well as their migration cease. The exuded Leucocytes get back into the circulation through the vascular walls or the lymphatics. The fibrin that has been deposited in the interstices of the tissues, is removed along with the serum by the lymphatics.

Chronic Inflammation.—If quick and proper resolution does not take place, the inflammation becomes a chronic one, and the following changes become evident.

- (a) There is an increase of the migrated white blood corpuscles and the tissue cells.
- (b) Between the new cells deposition of inter-cellular substance occurs. Eventually profuse organization of new connective tissue takes place.
- (c) Granulation tissue makes its appearance in this newly formed connective tissue with the growth of new blood vessels.
- (d) This granulation tissue gradually becomes changed into a thickening, and fibrosis occurs with growth of fibrous tissue.

Suppuration.—If an acute inflammation does not become chronic, and the inflammation be a bacterial one, suppuration occurs, *i.e.*, pus is formed. The formation of pus in an inflamed tissue always depends on the verulency of the bacteria infecting the tissue and the power of resistance (against the infection) of the tissue involved. As already stated there are profuse number of white blood corpuscles migrated into the inflamed area; these white blood corpuscles begin fighting with the infective organisms, and the issue of the inflammation depends upon the result of the fight. If the white blood corpuscles get the upper hand, they devour the dead white blood corpuscles, and gradually normal condition is restored. If the battle goes on for a long time neither party winning, the inflammation becomes chronic. If the bacteria win the fight, lots of these white blood corpuscles are killed, and formed into pus cells. Other healthy white blood corpuscles come to their rescue, and meet the same fate. Gradually the lymph spaces become engorged and distended with accumulation of pus which travels towards the direction of least resistance, comes up to the surface, the skin ruptures, and the pus is evacuated. If the pus does not naturally come up to the surface, or it is not evacuated by surgical interference, it remains lodged into a cavity and

gives rise to several serious constitutional symptoms. The cavity enlarges, the pus may travel towards one of the cavities of the body and finally open into it.

Treatment of Acute Inflammation :—

- (a) Local Treatment.
- (b) Constitutional Treatment.

Local Treatment.—

1. The immediate exciting cause should be found out, and removed.
2. The inflamed part should be given complete rest.
3. The hyperaemia, pain and exudation of serum should be reduced by reducing the local blood pressure. And to attain these objects, the following steps should be taken :—

(a) The inflamed limb should be kept elevated from the general level of the body.

(b) Local blood-letting may be performed under strict anti-sepsis.

(c) Application of cold—douche or ice-bag on the inflamed part causes contraction of the arterioles, and thereby reduces the hyperaemia. This should be applied during the first 24 hours of the exciting cause or the first appearance of the local symptoms. But after 24 hours, cold application should be stopped, because if it be continued, the vitality of the part will be lowered, and more harm than good will be done. Now hot application or mild counter irritation is indicated. It relaxes the blood vessels and tissues. The tension and pain are reduced, and the vascular supply also the local cell activity are increased.

4. The Local putrefactive changes caused by the access of fresh infective bacteria into the damaged tissues should be prevented by application of antiseptic dressings.

Constitutional Treatment.—As the inflammation varies with the condition of the patient, the treatment should be very carefully undertaken. The toxin in the blood should be got rid of by administration of diaphoratics and purgatives also diuratics. Quinine may be given with success. Stimulants should be given, also nourishing and easily digestible diet.

In some cases with cerebral troubles venesection may be performed.

In cases of acute inflammation due to *Streptococcus*, *Erysipelas*, etc., Anti-toxic serum may be necessary.

Treatment of Chronic Inflammation :—

Local Treatment.—The removal of the cause should be the first aim of the treatment.

The part should be given rest, and the joints immobilized.

Counter-irritation to the inflamed region serves the purpose very well. It could be and should be applied in different ways according to the different inflammatory conditions.

- (a) Painting of Iodine or even causation of blisters.
- (b) Application of "Scotts" dressing.
- (c) Actual cautery.
- (d) Friction by hand or with some stimulating embrocation.
- (e) Application of Elastic bandages, causing systematic pressure on the veins of an affected limb, and thereby promoting and facilitating free circulation of blood towards the heart.
- (f) The most important and valuable means are Massage and Passive movements (in cases of chronically inflamed joints).

Constitutional Treatment.—Tonics should be prescribed to improve the general condition. In cases of inflammation caused by

specific diseases, *e.g.*, Syphilis, etc. Specific Constitutional Treatment should be adopted.

Healing of Wounds.—It takes place under four different processes :—

1. Healing by first intention.
2. Healing by granulation.
3. Healing under a scab.
4. Healing by organisation of a blood-clot.

Healing by first intention.—It is a condition of simple adhesive inflammation of tissues, following its solution of continuity. It naturally takes place as a sort of primary union in clean cut aseptic wounds, where the lips of the wound are at rest and in contact, also there is not much collection of blood or exuded material between the lips. There is a very thin layer of blood-clot lying between the surfaces of the wound, and penetrating into the interstices. In course of time the blood-clot is easily absorbed. The process of union is effected usually in course of a week.

Healing by granulation.—It is as a matter of fact healing by second intention. It occurs in a wound where the lips of the wound are not in close contact, due to a definite loss of substance in between the lips during the time of injury, or by sloughing afterwards. It may occur in some cases of septic infection, where healing by first intention has been prevented. If the intervening dead tissue is aseptic, the influx of white blood corpuscles exuded from the neighbouring blood vessels starts as a sort of invasion upon the same. The uninjured connective tissue cells situated just beneath the wound steadily multiply, and new capillaries develop on the top of the undamaged tissue at the base of the wound. Fibroblasts make their appearance. They are supplied with developing vessels, and small round points of granulations are formed. These granulating layers of cells multiply with the surrounding connective tissues, and approach towards the surface. Many of the newly formed blood vessels subsequently become obliterated, and a scar tissue is formed.

Healing under a scab.—This form of healing usually occurs when the wound is superficial. Healing by granulation takes place under the scab formed by the dry exudations from the wound. Along with the development of the granulation tissue there is also an inward growth of Epithilium. As soon as the surface of the wound beneath the scab is completely covered with Epithilium, the scab falls off.

Healing under a scab is sometimes encouraged in certain wounds by surgeons with an application of collodion, etc. But it occasionally becomes dangerous, as a minute quantity of septic or putrefactive organisms may get access into the wound, and the stuff being kept mechanically under pressure of the applied collodion, inflammation with sepsis may follow.

Physical Examination of Patients.—The main object of the physical examination of a patient is to find out, and classify into different groups all the symptoms which help to make the diagnosis of the case easy. As in some cases the general outlook of the patient indicates a certain disease, but after a systematic and careful examination, it is found that there exists more than one disease which a cursory inspection would not have enabled the physician to make any correct diagnosis.

When examining a patient, as a general custom the following points should be recorded :—

1. The patient's name.
2. Age.
3. Occupation.
4. Address.

The patient should be encouraged to state the history of his suffering from the very beginning, and the question should be put in such a way as to help him to remember, and freely explain the history. The process as a matter of fact helps the physician a lot to peep into the objective symptoms, and decide what special part or parts of the body should be examined.

In examining the limb of a patient, the physician should proceed in the following way. The part of the body that is to be examined, should be completely uncovered, as this will give a comprehensive idea of the swelling, depression and size in comparison with the healthy side at a glance. Before touching the part he will look into :—

- (a) The colour, any contusion or a scar mark, etc.
- (b) Any oedema, effusion, etc.
- (c) Any change in the outline which may be the indication for fracture, dislocation, etc.
- (d) Any atrophy of the muscles.

In examining the diseases of the different systems, the special points that are to be noted, and the way the organs to be examined, have been explained as following :—

When dealing with a case of digestive disorder, it should be noted that, the stomach in a normal and healthy person lies almost entirely within the bony framework of the Thoracic cavity, except its Pyloric end is exposed in the abdomen, having the left lobe of the Liver partly overlapping it. The normal position of the Pyloric orifice is three-fourth of an inch to the right of the middle line. The area of the stomach can be mapped out by percussing the stomach. When it is moderately distended, tympanitic sound is heard over the area.

In DISEASES OF THE DIGESTIVE SYSTEM, the examination of the abdomen should be systematically done, and the procedure should be as following :—

- (a) Inspection.
- (b) Palpation.
- (c) Percussion.
- (d) Mensuration.

Inspection.—It should be first observed :—

1. Whether the abdomen is enlarged or not.
2. If enlarged, whether it is a localised enlargement or general,

3. Whether the umbilicus is in its normal, *i.e.*, central position.
4. Whether there are dilated veins on the surface, as may be found in obstruction of the portal vein and the Vena Cava.
5. Whether or not the umbilicus is free from any thickening round it.
6. Whether there are white lines (*Linæ Albicantis*) on the lower abdomen of women, indicating previous pregnancy.

Palpation.—The hand should be warm (about the normal body temperature), and laid flat on the abdominal wall. As pressing with the tips of the fingers, like the playing on a piano, gives rise to some local reflex irritation, causing the muscular wall rigid by contraction. It makes the examination impossible. In cases where the patient is sensitive, his or her attention should be diverted to some other objects when examining the abdomen. Sometimes the examination becomes easy, if the patient is asked to open his mouth and breathe through it during the palpation.

Percussion.—Normally, when the stomach and intestines are empty, the anterior surface of the abdomen is resonant upwards as far as the right Hypochondriac, the Epigastric and the left Hypochondriac regions, downwards as far as the pubis, and outwards as far as the outer border of the ascending colon on the right, and of the descending colon on the left.

Mensuration.—By mensuration the increase or decrease of the size of the abdomen can be detected. In the normally built healthy individual, the distances of the umbilicus from the tip of the Ensiform cartilage above, the Pubis below and the anterior superior spine of the Ilium on either side, are all equal. But this standard of measurement does not hold good in cases having plenty of omental fat, ascitis, pendulous belly or pregnancy.

IN DISEASES OF THE CIRCULATORY SYSTEM, the condition of the artery and the Heart should be first examined.

The condition of the arteries is usually ascertained by the tracings of the Sphygmometer, and the amount of blood pressure by the Sphygmomanometer.

The Heart which is the most important organ in the circulatory system can be examined by :—

1. Inspection.
2. Palpation.
3. Percussion.
4. Auscultation.

Inspection.—In the ordinary healthy individual, the apex beat of the Heart (impulse) can be seen in the fifth intercostal space, about half to one inch inside and below the left nipple.

In the diseased condition of the Heart, various changes are manifested in the position of the “impulse.”

Displacement of the Heart, especially its apex, causes the impulse to be displaced, or even obliterated by the enlargement of the Heart itself, or the enlargement due to the inflammation or otherwise of the other neighbouring thoracic or abdominal viscera.

Palpation.—Besides being seen with the eyes, the impulse can be felt quite distinctly by the flat of the hand, and can be localised with the finger tips. The localisation of the apex beat is the most important factor, as the position, extent and force of the apex beat are the three principal features which throw a flood of light on the diagnosis of the Heart Disease. As for example, in Hypertrophy of the left ventricle of the Heart, we feel the apex to be displaced downwards and outwards, the impulse is heaving and forcible in character. In dilatation of the left ventricle, the impulse is diffuse and wavy. Again in hypertrophy of the right ventricle we feel the pulsation in the Epigastrium and in the lower left interspaces ; while the apex is in its normal situation.

In certain valvular diseases of the heart, a thrill can be felt with the hand, *e.g.*, the "Systolic Thrill" is felt at the aortic area, due to aortic stenosis. A pre-systolic thrill is felt at the apex, due to mitral stenosis. Again in advanced cases of aortic regurgitation, a Diastolic thrill can be felt over the Manubrium.

Percussion.—The superficial area of "cardiac dullness" can be mapped out by percussion. It is triangular with the apex upwards. The measurements in the normal adult individual are $3\frac{1}{2}$ inches transversely, and $2\frac{1}{2}$ inches to 3 inches vertically, along the left border of the Sternum. The right border starts at the level of the fourth costal cartilage, and corresponds to a vertical line drawn slightly to the left of the middle line of the Sternum. The left border starts from the same point, runs downwards and outwards along the lower border of the fourth costal cartilage to almost its (costal cartilage) junction with the rib. Then forming a curve downwards finishes at the impulse (apex beat). The lower border is continuous with the Liver dullness.

The deep area of cardiac dullness is bigger than the superficial one by three-fourth of an inch on each side, and one inch upwards.

By mapping out the pre-cordial dullness in a patient, we are able to classify both acute and chronic diseases of the Heart by the presence or absence of an enlargement.

Effusion of the pericardium, hypertrophy or dilatation of the Heart, or usually both hypertrophy and dilatation are the chief causes of enlargement of the precordial area of dulness.

Auscultation.—If we put the chest piece of the Stethoscope on the cardiac region of the chest, we hear the peculiar sounds of the heart. The first duller and longer sound called the Systolic sound. The second sharper and shorter sound called the Diastolic.

The first sound is best heard at the site of the apex of the heart, and is due partly to the muscular contraction, and partly to the closure of the mitral and tricuspid valves.

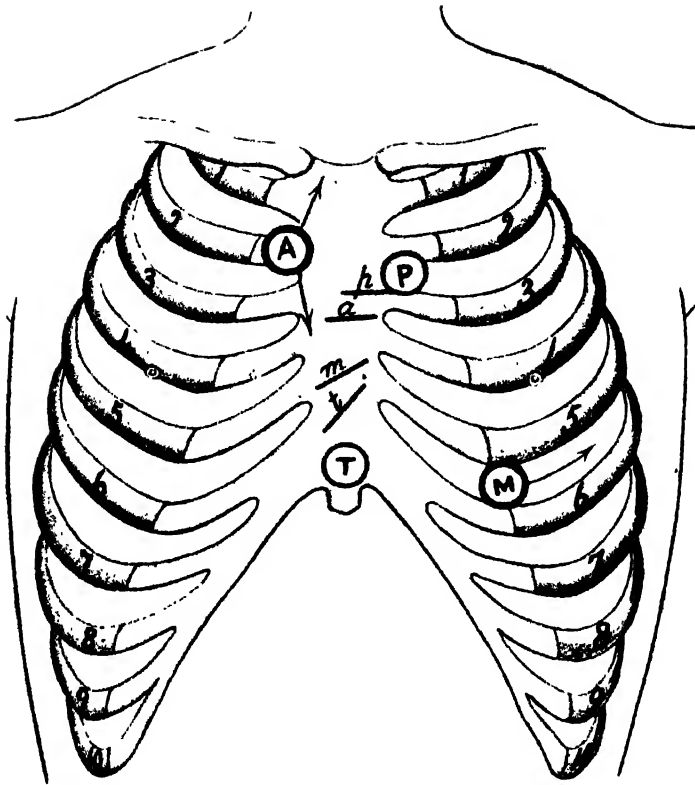


Diagram showing the Clavicle, Sternum and Ribs exposed ; the localisation of the Cardiac Valves, also the positions where the murmurs are best heard.

a—Aortic Orifice.

m—Mitral Orifice.

p—Pulmonary Orifice.

t—Tricuspid Orifice.

A—Aortic murmur directed along the right border of the Sternum as indicated by the arrow mark.

M—Mitral murmur directed towards the Axilla as indicated by the arrow mark.

P—Pulmonary murmur.

T—Tricuspid murmur.

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The second sound is best heard at the base of the Heart, and is due to closure of the aortic and pulmonary valves.

Due to diseases, altered Heart sounds, that is, modifications of Heart sounds are heard at those sites already mentioned.

Altered sounds of the valves, and where they are best heard,—

Mitral—at the apex.

Aortic—on the second right costal cartilage.

Pulmonary—on the second left intercostal space

Tricuspid—on the lower end of the Sternum.

Altered sounds of the Heart and their causes—

The different altered sounds of the Heart that are usually heard in general practice are :—

(a) Murmurs

(b) Re-duplicated sounds

(c) Accentuated sounds.

(d) Clear sharp sounds.

(e) A booming (exaggerated or unduly loud) first sound.

Murmurs.—1 Systolic Murmurs with first sound heard at the apex, are due to mitral regurgitation.

2 Pre-systolic Murmurs limited to the apex, are due to mitral stenosis

3 Systolic Murmurs at the aortic area and conducted along the carotid artery, are due to aortic stenosis.

4. Diastolic Murmurs at the aortic area and conducted downwards along the Sternum, are due to aortic regurgitation

Re-duplicated sounds.—A re-duplicated first sound (at the apex) indicates high tension in the arterial system. A re-duplicated

second sound (at the base of the heart) is heard when the pressure in the pulmonary system is very high, and the aortic and pulmonary valves do not synchronously close. In mitral stenosis this re-duplication of the second sound is heard slightly to the right of the apex of the heart.

Accentuated sounds.—In cases of high arterial tension or in aortic aneurism, an accentuated second sound is heard in the aortic area at the base of the heart.

In cases of mitral valve troubles, an accentuated second sound at the pulmonary area is heard.

Clear sharp sounds are heard in cases of cardiac dilatation.

A booming (exaggerated or unduly loud) first sound is heard in cardiac hypertrophy.

A feeble Heart sound is heard in Fatty Heart or in Precordial Effusions.

In DISEASES OF THE RESPIRATORY SYSTEM, the physical examination is carried out under the following headings :—

1. Inspection and Mensuration.
2. Percussion.
3. Palpation.
4. Auscultation.
5. Examination by scientific instruments.

Inspection and Mensuration.—Both Inspection and Mensuration may be carried out at the same time. The chest should be exposed in good light, the patient asked to stand erect preferably, and take in deep breath. Note the movements in the front and in the back, also the sides. The measurement of the circumference of the chest is taken round the chest, just below the nipples. The rate and character of the breathing, the chest capacity, and the shape, also the size (as regards Rachitic changes, Flat Chest, etc.) should be carefully noted.

The cross section of the chest of a healthy child is more or less circular in shape, while that of a healthy adult is almost elliptical. The diameter of the section from side to side is longer than that of the antero-posterior. The chest is more or less symmetrical, but as a matter of fact, the right side is slightly bigger than the left. The clavicles form a moderate prominence.

Among the diseases that cause abnormality in the shape of the chest are usually Rickets, Emphysema and Phthisis.

In Rickets which is commonly found in children, the characteristic shape is assumed, as shown in the cross section figure A. There are beaded junctions of the cartilages and the ribs.

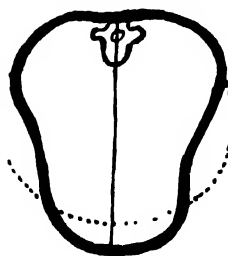


Fig. A.—"Rachitic Chest" is represented by the deep line.
The dotted line represents the normal outline.

In Emphysema, the chest becomes barrel shaped, as indicated in figure B.

Pigeon chest—figure C.—The cross section shows a deep triangular line. It indicates that the subject has been suffering from respiratory obstruction since the childhood.

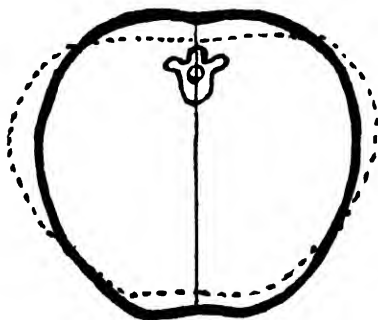


Fig. B.—“Emphysematous Chest” is represented by the deep line.

The dotted line represents the normal outline.

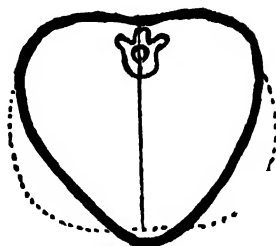


Fig. C.—“Pigeon Chest” is represented by the deep line.

The dotted line represents the normal outline.

In Phthisis the chest becomes too long vertically. The antero-posterior diameter is larger than the transverse.

The asymmetry in the shape of the chest is usually manifested as :—(1) undue prominence, (2) flattening.

Prominence of one side may be due to :—

- (a) Lateral curvature of the spine, having a corresponding convexity of the chest on the other side.
- (b) Tumour, Pleuritic effusion of fluid, Pneumo-Thorax or Abscess in the chest.
- (c) Greatly enlarged Liver or Spleen, causing bulging of the lower sides of the chest, right and left respectively.

Flattening of the sub-clavicular region of the chest indicates collapse or useless condition for respiration, of the underlying Lung tissue locally.

Flattening of the other part of the chest wall may indicate collapse of the Lung also.

For a long and vigorous life, no physical gift is of more importance than healthy and capacious lungs. The capacity of the chest is usually considered to be the test of health and stamina

of the individual. This can be measured by an instrument called "Spiro-meter". The VITAL CAPACITY is the maximum air space in the Lungs. It is ascertained by measuring the greatest quantity of air that can be expired forcibly from the Lungs through the mouth by one full blowing.

Table for the measurement of the capacity of the Chest.—

CHILDREN

Age.	Average Height.	Average Chest Measurement.
10	4' 5½"	25 inches.
11	4' 7"	26 "
12	4' 9"	28 "
13	4' 10"	29 "
14	5' 1"	30 "
15	5' 3"	32 "
16	5' 4½"	33 "

ADULTS

Age.	Height.	Average Chest Measurement	Weight in Pounds.	Chest capacity by Spiro-meter.
25 to 30 years.	5' 1"	34"	...	175 Cubic Inches.
	5' 2"	35' 1 Inches	...	177 " "
	5' 3"	35' 7 "	...	190 " "
	5' 4"	36' 2 "	115	200 " "
	5' 5"	36' 8 "	126	205 " "
	5' 6"	37' 5 "	128	215 " "
	5' 7"	38' 1 "	132	225 " "
	5' 8"	38' 5 "	134	230 " "
	5' 9"	39 "	140	242 " "
	5' 10"	39' 6 "	142	246 " "
	5' 11"	40 "	150	258 " "
	6'	40' 5 "	155	265 " "
	Over 6'	42 "	...	280 " "

Percussion.—

Percussions are of two kinds :—

(a) Immediate.

(b) Mediate.

Immediate.—That is the usual form of percussion of the chest which is done by striking the chest directly with a light hammer or the tips of the fingers.

Mediate.—The percussion is done by placing a piece of ivory or a small bit of mahogany wood on the chest, and striking it with the finger or a light hammer.

To produce the normal resonance of the lungs, the striking force should be slightly greater than that is required to chalk out the cardiac dullness. The best way to proceed in percussing the Lungs is, to start at the Apex above the clavicle. Percuss each side, compare the healthy side with the unhealthy one, and gradually proceed downwards, placing the index or the third finger of the left hand flat on the chest horizontally, and strike the dorsal aspect of it with the tip of the index finger, or both the index and the third fingers of the right hand. The striking blow should come from the wrist, and not from the elbow.

When percussing the back of the chest, the patient should be asked to cross his arms in front and a little forward, so that the scapulae are pushed both ways outside, and thereby exposing the chest cage more in the centre.

The lower limit of the Lung resonance is the upper border of the 11th rib on the right side and the lower border of the 11th rib on the left. During deep inspiration, the Lung resonance extends about an inch lower than the 11th rib. While, during deep expiration it is found to be about an inch higher than normal.

When the Lung tissue becomes solid due to some inflammatory congestion, the Lung resonance is much diminished, and dullness is experienced on percussion. The Lung resonance is increased (Hyper-resonance) when the Lung tissue underneath is full of air,

as in the case of Emphysema, where there is a cavity towards the surface (Pulmonary Tuberculosis), or where there is air in the Pleuræ (Pneumo-Thorax).

If there is a Pneumonic consolidation or a Pleuritic Effusion, the part of the Lung above the consolidation or the effusion, becomes unduly resonant. It is called "Skodæic Resonance".

Palpation.—By Palpation the vibration of the voice (vocal fremitus) can be felt by the hand. It is more marked in adult men, than in women or children whose voice is usually of a high pitched type.

In case of consolidation of the Lung tissue as in a case of Pneumonia or Phthisis, the vocal fremitus is increased, but in the case of accumulation of fluid, as in a case of Pleurisy where the Lung is separated more or less from the chest wall, the vocal fremitus is diminished.

Auscultation.—It means hearing the sound produced by the Lungs during the process of inspiration and expiration. This can be done by placing the ear directly on the chest, on the very spot where the respiratory sounds of the lung underneath is to be heard. In every case it is not possible, neither it is convenient to place the ear directly on the chest. In these cases a stethoscope well serves the purpose. The earpiece of the stethoscope should be put in the ear of the physician, and the chest piece should be placed flat against the chest of the subject, and held in that position by the index finger and the thumb.

The following points should be observed during auscultation:—

1. The character of the respiration.
2. The length of the respiration.
3. The adventitious sounds produced within the Lungs.
4. The condition of the vocal resonance.

The Character of the Respiration.—By careful auscultation the "Vesicular murmur" is elicited. This murmur is due to the vibrations produced in the air vesicles, as the air passes through the minute bronchial tubes to the wider alveolar spaces. The passing of the air through the space between the vocal cords

during respiration is partly responsible for the causation of this vesicular murmur. It is distinctly heard during inspiration, but is scarcely audible during expiration which is as a matter of fact, caused by the elastic recoil of the Lung tissue. There is no distinct pause between these two (inspiration and expiration) sounds. The respiratory murmur is very loud in children.

The breathing is "tubular" or "bronchial" when the Lung tissue is congested, and becomes more or less solid. The respiration through the congested bronchioles is heard like the sound made by blowing through a tube or a pipe. This sort of breathing is usually heard in Tuberculosis of the lungs or in Pneumonia.

A cavernous breathing means an exaggerated bronchial breathing. It is usually heard when the sound is produced in a dilated bronchus, or when a cavity is formed in the Lungs, and the sound is transmitted to the surface.

Amphoric breathing is heard in a case of Pneumo-Thorax. The sound is like air entering a bell-jar.

The Length of the Respiration.—The length of the respiration (inspiration and expiration) should be noted. The ratio is usually one to two. In cases of diseases involving loss of elasticity of the Lung tissue, the expiration is much more prolonged than in normal.

Adventitious sounds (produced within the Lungs).—They are the sounds that are heard in addition to the ordinary breath sounds, or combined with the modified breath sounds, such as tubular, cavernous, amphoric, etc. These adventitious sounds are pleuritic frictions, rales, crepitations and ronchi.

Friction sounds (Pleuritic friction) are heard when the two layers (visceral and parietal) of the Pleura become inflamed and rough. They rub against each other during respiration, and a sort of rustling sound (as caused by rubbing one piece of muslin against another) is produced.

Rales.—When there is soft, moist mucous present in the bronchial tubes, moist rales are heard. When the air passes

through the bigger bronchioles, the sound is heard as air bubbles passing through a fluid. The small mucous rales are heard when the air passes through small bronchioles full of moist mucus.

Crepitations.—They are moist small finer rales simulating pleuritic frictions. But they are distinguished from pleuritic frictions as they are only heard during inspiration. While a pleuritic friction is heard both during inspiration and expiration.

Rhonchii are like musical sounds. They are caused when there is some obstruction in the bronchial tubes, caused by thickening of the mucous membrane, or spasmodic contraction of their muscular fibres. The sound varies according to the size of the bronchial tubes, and also the extent of the narrowing. The sounds produced are like groaning, cooing, snoring or whistling.

Rhonchii are of two kinds :—

- (a) Sonorous Rhonchii.—These are produced in a large bronchial tube, and are lower pitched.
- (b) Sibilant Rhonchii are produced in a smaller bronchial tube, and are higher pitched.

The condition of the vocal resonance (voice sounds).—When the stethoscope is applied on the chest of the patient, and he speaks low or high, the sound (voice) is transmitted more or less into the air through the stethoscope. This sound is called vocal resonance. The increase of the vocal resonance (Bronchophony) depends upon the amount of consolidation of the Lung tissue under examination. It is greater in tubercular or pneumonic consolidations. It is decreased, or even absent in children or females with high pitched voice.

Pectoriloquy.—It is distinguished from Bronchophony by its clear transmission of articulate sounds. It is best observed by asking the patient (who is suffering from Pulmonary Tuberculosis, and has a large cavity formed in the Lung) to speak with very low voice, or even whisper.

Aegophony (Bleating of a goat).—In a Pleurisy case with effusion, the highest pitched tone of the voice sounds are conducted towards the angle of the scapula at the back where they are best heard.

IN DISEASES OF THE GLANDULAR SYSTEM, where some defects in the "Glands of Internal Secretion" are suspected, a thorough physical examination of the patient regarding his appearance, and the physiological condition of his internal organs whether defective or otherwise, should be carefully noted.

The following are the Glands of Internal Secretion, the over-secretion or under-secretion of which causes special physical and mental symptoms to manifest in the patient :—

1. Thyroid Gland.
2. Para-thyroid Gland.
3. Suprarenal.
4. Testes.
5. Ovaries.
6. Pituitary Gland.
7. Pineal Gland.
8. Thymus Gland.

Thyroid Gland.—The special symptoms manifested by :—

Oversecretion

1. Small stature, thin fingers.
2. Overgrowth of hair.
3. Soft skin.
4. Teeth pearly white and well formed.
5. Dyspepsia with hyper-acidity.
6. Irregular and rapid heart, rapid breathing.

Undersecretion

1. Stunted growth, fingers thick and club-like.
2. Scanty growth or falling of hair, the outer third of the eyebrows scanty.
3. Skin thick and rough.
4. Constipation marked.
5. Dentition delayed, teeth irregular.
6. Bradycardia.

Oversecretion

7. General metabolism greatly increased.
8. Loss of weight.
9. Exophthalmic Goitre.
10. Sexual activity low.

Undersecretion

7. General metabolism lowered, with lowered blood-pressure. Asthenia present with mental inertia.
8. Obesity marked.
9. Sexual activity lowered.

Parathyroid Gland.—The special symptoms manifested by :—

Oversecretion

1. Defective calcium metabolism, with deposition of calcium salts.
2. Early arterio-sclerosis, with high blood-pressure.

Undersecretion

1. Irritability of the peripheral nerves, causing spasms in the muscles of the face, hands and feet.
2. Dyspepsia marked, leading to gastric or duodenal ulcers.

Ovary.—The special symptoms manifested by :—

Oversecretion

1. Big bony framework, early development, early dentition.
2. Early development of pubic and axillary hair.
3. Sexual precocity in development and desire. In females early menstruation, usually Menorrhagia.
4. Blood-pressure low.

Undersecretion

1. Bony framework thin and tall, but there is accumulation of fat causing obesity.
2. Pubic and axillary hair scanty.
3. Sexual development slow, and usually the desire and activity low. In the female, irregular menstruation.
4. Blood-pressure high.

Suprarenal Gland.—The special symptoms manifested by:—

Oversecretion

1. Overgrowth of coarse hair, very prominent eyebrows which meet together in the centre. In females growth of beard is manifested.
2. Quick mentality.
3. Sexual organs large. Early sexual development. In the female, the clitoris is enlarged. Precocity in sexual activity and potency.
4. Large canine teeth.
5. Tachycardia and high blood-pressure.
6. Obesity, later loss of weight.

Undersecretion

1. Growth of hair scanty.
2. The complexion is unusually dark. Pigmentation is marked in the sexual organs and in the areolae of the nipples.
3. Loss of mental activity.
4. Usually undeveloped sex organs.
5. Blood-pressure low. Breathing shallow.
6. Loss of weight. Poor muscular development.
7. Teeth pigmented.

Pituitary Gland.—The special symptoms manifested by:—

Oversecretion

1. The bony framework is large, with the facial bones and the epiphyses of the long bones distorted. Fingers thick and clubbed.

Undersecretion

1. Small bony framework. Tapering also narrow fingers.

Oversecretion

2. Skin dry and thick, thick lips, and the tongue enlarged.
3. Eyebrows thick. Excessive growth of hair in the chest and the extremities.
4. Sexual organs large. Later on Achromagally is manifested, and loss of sexual desire comes in.
5. Teeth not closely set. The incisors are widely distributed.
6. Tendency to diabetes.

Undersecretion

2. Soft, delicate skin.
3. Growth of hair usually scanty.
4. Sex organs are of small size. Poor sexual desire. Impotence.
5. Bradycardia. Temperature usually low.
6. Want of alertness. Lack of initiative.
7. Obesity marked, especially at the mammary and the girdle regions.

Testes.—The special symptoms manifested by :—

Oversecretion

1. Bony framework large and quickly developing.
2. Early development of pubic and axillary hair.
3. Sexual organs large. Sexual precocity and activity marked.
4. Early dentition.

Undersecretion

1. Bony framework thin, with usually tall figure. Poor muscular development.
2. Growth of hair scanty. Distribution of hair [feminine.
3. Sex organs undeveloped, usually small, and infant-like.
4. Slow mentality, lack of initiative.

Thymus Gland.—The special symptoms manifested by :—

Oversecretion

1. The bony framework tall, with the physical contour of the opposite sex.
2. Skin unusually white.
3. Sex organs usually undeveloped. Infantilism present.
4. Arrhythmia in cardiac action.
5. Muscular weakness.
6. Large middle incisor teeth.

Pineal Gland.—The special symptoms manifested by :—

Oversecretion

1. Bony framework large. Figure tall.
2. Hair development excessive.
3. Sexual precocity. Early potency. Sex organs enlarged.
4. Obesity.

In dealing with the DISEASES OF THE NERVOUS SYSTEM, the following symptoms should be observed.—

(a) **Motor Symptoms :—**

1. Convulsion or Spasm.
2. Inco-ordination.
3. Paralysis.

(b) **Sensory Symptoms :—**

1. Anaesthesia.
2. Hyperaesthesia.
3. Sensibility to weight or pressure.
4. Analgesia.
5. Sensibility to temperature.
6. Muscular Sensibility.
7. Sensibility to the shape and size of an object.

(c) **Pain.**

(d) **Changes in Nutrition.**

(e) **Electrical Changes.**

(f) **Special Senses.**

Convulsions or Spasms.—They are morbid muscular contractions involuntary in character. They may be :—

- (a) Clonic, *i.e.*, interrupted.
- (b) Tonic, *i.e.*, Continuous.

Clonic Spasm is the type of spasm that is usually met with in Epilepsy, Eclampsia (Puerperal), Uraemia, Irritant Poisoning and Organic Cerebral Diseases. In Diseases such as Chorea and Spasmodic Tics, the convulsions are sharp, and the contractions and relaxations of the more isolated muscles, are more slow.

Tremors or tremblings are caused by alternate contraction and relaxation of the antagonistic muscles. They occur in very quick successions, about six or eight times in a second, and the displacement of the limb is very small, it may be one-eighth or one-tenth of an inch.

Intention Tremors.—In these the limbs are quiet when at rest. But when an attempt to perform any movement is made, the tremor starts.

Twitchings.—These are quick contractions of isolated portions of muscles.

Tonic Spasm.—In this the contractions of the Muscles are continuous for several seconds or minutes. They may persist for a week or a month, and gradually cause contraction of the limb. This sort of spasm is to be found in Tetanus, Hysteria, Strychnine poisoning, Writers' Cramps, Congenital Myotonia, etc.

Athetosis.—It is a peculiar condition of slow motor spasm, intermittent between Clonic and Tonic spasms.

Spasticity.—It is a sort of persistent or too readily induced contraction of the muscles of the limb. This occurs when there is some change in the Pyramidal tract of the Spinal Cord. In such conditions, the inhibitory control of the cerebrum is diminished, or completely lost, and the reflex centres in the spinal cord become uncontrollable.

Inco-ordination.—During the movements of the whole limb or part of a limb, when different muscles or groups of muscles are used to cause the performance, a suitable form of contraction is required by an individual muscle as well as the groups of muscles concerned. If the manoeuvre is imperfect, there follow the irregular movements of the limb causing inco-ordination.

In such conditions, if the patient is asked to walk along straight, he waddles or reels.

A good test for inco-ordination is Romberg's Test. It is done as follows :—The patient is asked to stand with his feet close together, and then close his eyes. He will be seen to become unsteady. This is due to some defect in the afferent nervous apparatus.

Paralysis.—By Paralysis is meant loss of power in the muscles. It is usually due to some injury to the nervous system. But it

occurs in some cases of disease in the muscular substance itself, *e.g.*, in Pseudo-Hypertrophic Muscular Palsy.

Paralysis may be partial, or it may be complete, that is causing complete inability to movement.

Paralysis of the arm is usually tested by asking the patient to grasp a Dynamometer, and grip it very firmly, or lifting a small or comparatively heavier weight off the ground (flexion of the biceps), or lift a weight above his head (extension by contraction of the triceps muscle).

Paralysis of the lower limb is tested by asking the patient to stand erect, or stand on his toes, or carry some weight (on his back, shoulder or head) for some distance. If the patient is lying in his bed, the test could be performed by asking him to raise the foot and the leg off the bed, or draw the knee up to the abdomen. The power of the abdominal muscles are tested by raising the trunk above the bed, without using his arms as help.

Anaesthesia.—It is the loss of sensibility to touch. It can be tested by touching the skin with a very light substance, such as cotton wool or feather, while at the same time asking the patient to close his eyes. The patient should now be asked to say what part of the body (that is the exact site) has been touched.

The amount of tactile sensibility is greatest at the tip of the tongue, then the finger tips, the lips, the cheeks, the back of the fingers, the forehead, neck, forearm, leg, the dorsum of the foot, the chest, the back of the upper arm and the thigh; the latter having less tactile sensibility than the former.

Delayed sensation.—The condition of the sensation may be immediate, or there may be an unusually long interval between the application and the appreciation of the stimuli.

Hyperaesthesia.—It is a sort of greater sensibility to touch, *i.e.*, when a sort of pain is felt to a very delicate touch which does not create any appreciable amount of sensibility in a healthy subject.

Sensibility to Weight & Pressure.—This can be tested by some weight applied on the skin. The minimum variation of the weight that can be recognised by healthy subjects is one-twentieth of the total weight applied.

Analgesia.—Is the diminished sensibility to pain. This can be tested by piercing the skin or pricking the part with a needle.

Sensibility to temperature.—This can be tested by application of a heated or a cold spoon on the skin.

Muscular Sensibility.—This is tested by placing some weight on the patient's palm of the hand, and asking him to estimate the weight.

Pain.—In case of a patient complaining of pain, the subject should be carefully examined. The exact site of the pain should be found out, and the kind of pain whether it is burning, aching, stabbing or shooting, also whether it is continual or intermittent, should be ascertained.

Changes in the Nutrition of Tissues (Atrophy).—It is most marked in injury to nerve trunks, and their centres.

Appreciable wasting or atrophy of the muscles is manifested in Acute Poliomyelitis, where there is lesion in the anterior cornu of the Spinal Cord, or in Neuritis where the nutrition of the nerve itself is lost due to inflammation. Again, the Atrophy is not marked in cases having lesions in the brain or spinal cord, affecting only the upper Neurons.

The wasting of muscles is manifested by its getting flabby in consistency, and gradually diminishing in size and extent.

In cases of changes in nutrition, the skin becomes thin, red and glossy. There may be vesicular eruptions, oedema, even ulceration. The growth of hair is retarded, and the nail stops growing, also becomes brittle. Atrophy of bones may also occur. It may become rarefied and brittle.

Reflexes.—In dealing with a nervous case, three kinds of reflexes are to be investigated :—

1. Deep reflex or Tendon reflex.

2. Superficial reflex.
3. Organic reflex.

Deep Reflex.—It is a sort of reflex, a jerky movement of a limb. It is produced when the tendon of a muscle is suddenly put into a stretch, by striking it with a light weight. The tendon reflexes that are usually obtained in general practice :—

- (a) Knee jerk (by striking the patellar tendon).
- (b) Ankle Clonus (by striking the Tendo Achillis).
- (c) By striking the Triceps Tendon.
- (d) By striking the dorsal aspect of the wrist, *i.e.*, the extensor tendons of the forearm.

Knee Jerk.—To elicit the knee jerk, the patient should be asked to sit on the edge of a chair or table, with his legs hanging free, and not to pay any attention to the manoeuvres, but to look at the ceiling. Now if the patellar tendon be struck sharply with the tips of the fingers, the leg will immediately jerk forward, due to sudden contraction of the quadriceps extensor thigh.

The strength of the knee jerk varies in health. It is more marked in adults, but less in young and the old.

It is exaggerated when :—

1. The lateral columns of the Spinal Cord are sclerosed.
2. There is irritation in some part of the reflex arc, as in Tetanus or Strychnine poisoning.
3. The inhibitory control of the cerebrum is defective.

It is diminished, or even lost, in cases where there is lesion in the lower motor neurons, or when the reflex arc is destroyed by some disease, *e.g.*, Infantile Palsy, Disease of the Anterior Horn, Peripheral Neuritis, or some chronic spinal lesions, *e.g.*, Tabes Dorsalis.

Ankle Clonus.—It is the spasm communicated to the calf muscles, by putting the Tendo Achillis into a stretch. The patient's

knee is supported with one hand, and with the other the foot is suddenly dorsiflexed. The pressure of the hand on the sole is maintained throughout the manoeuvre. It is found in cases where the upper neurons are damaged.

Supinator Jerk.—It is taken by tapping the tendon just above the styloid process of the radius.

Wrist Jerk.—It is done by striking the extensor tendon, when the hand is hanging loosely.

Superficial Reflex.—It is a sort of reflex contraction of certain muscles, caused by stimulation of certain part of the skin associated with the muscles. It is done with a blunt pin or the end of a wooden pencil.

These reflex contractions are prompt in children, and in women. But it is not so easily manifested in adults and elderly men, and is still more difficult to find in people whose skin is harsh and insensitive.

Planter Reflex.—The patient lying in bed on his back, the leg is kept slightly flexed, and the sole of the foot dry. Now if the sole of the foot is gently stroked, or scratched upwards by the finger nail, the great toe as well as the other toes will become flexed towards the sole. This happens in healthy people.

Babiniski's Reflex.—It is a modification of Planter Reflex—if the sole of the foot is stroked to get a planter reflex, there will be extension of the great toe with flexion of the other toes.

Organic Reflexes.—These are deglutition, respiration, defecation, micturition, etc. They are produced by contraction of the involuntary muscular tissues, as a result of automatic stimulation of the mucous membrane.

In several cases of nervous diseases, these organic reflexes are to be examined. If there be retention or incontinence present, it is due to some direct or indirect lesions in the lumbar portion of the spinal cord.

FOOD

Food plays the most important part in the maintenance of the human existence. There also exists a very intimate relationship between food and health. Food is the fuel, by the consumption of which the human body stores up its energy and nerve power. Our food, whatever it may be, mostly consists of the following elements :—Calcium, Iron, Phosphorus, Carbon and Copper. These elements are taken in with the food stuff, and after assimilation, enrich their individual elemental structures. Calcium goes to enrich the bones, Iron the blood, Phosphorus the nervous system, and so on. But the most important and the biggest volume out of these elements is Carbon, which is taken in its Organic or Inorganic form, with the food directly as well as indirectly. Organic Carbon is taken directly in the form of the ample quantities of starch, vegetables and fats to be consumed by the body, again indirectly from Protieds (meat or the eggs of fishes or birds) which have been accumulated in the body of the animals during their lifetime by feeding on vegetables.

The various substances which constitute our food, are scientifically styled as the proximate principles. They are the elements Carbon, Hydrogen, Oxygen and Nitrogen, combined more or less into highly complex bodies. They are classified under the following heads :—

- | | | | | | |
|-------------|---|-----------------------------------|-----|---|---------------------------------------|
| (a) Organic | { | Nitrogen, <i>e.g.</i> , Proteids. | ... | { | Fats |
| | | Non-Nitrogen | | | Starches, Sugars and Vegetable Acids. |
- (b) Inorganic—Mineral Acids.

Proteids—The elementary constituents are :—

Nitrogen	.	16 parts
Oxygen	.	22 ..
Carbon	.	56 ..
Hydrogen	.	7 ..
Sulphur	.	1 part

The greater part of our body is made up of Proteid elements or Nitrogen containing substances. A very big amount of Nitrogen in the form of Urea, Uric acid and other substances are daily being lost from our bodies by the Urine. To repair the loss a daily intake of Nitrogenous food is necessary.

The proteid foods are divisible into two groups. The more nutritious one is the group of true proteids, consisting of Albumin, Myosin, Glutin, Casein, Legumin and Peptones. In them the proportion of Carbon to Nitrogen is 7 to 2. The other, the less nutritious group, is called the Albuminoid group. It includes substances obtained only from animals. They are such as Gelatine, Chondrin, Osein and Keralin. In them the proportion of Carbon to Nitrogen is $5\frac{1}{2}$ to 2.

Albumin is the essential constituent of Protoplasm, which is the physical basis of life. We find it in the egg albumin. A similar body is the serum albumin of the human body, the chief constituent of the blood serum.

Myocin or muscle albumin is found largely in the muscles.

Glutin.—It is an insoluble proteid obtained from the seeds of cereals.

The three kinds of Albumin that are readily digested by the gastric juice :—

Casein—The milk proteid. It is the curd formed by the action of an acid on milk.

Legumin.—Resembles the proteid of the milk. It is present in peas and beans.

Peptones.—Are forms of proteids, widely distributed in vegetables and plants. They do not possess the same nutritive value as the other proteids.

Fats or Hydro-Carbons.—These contain Carbon, Hydrogen, and Oxygen, but no Nitrogen. When taken as food, the fats do not only repair the fatty tissues of the body, but produce heat and energy. This production of heat is caused by the Oxidation of fats into Carbonic acid gas and water. During the process of digestion, fats are not affected by either the saliva of the mouth or the gastric juice. They reach more or less unchanged into the small intestines, where they are emulsified, converted into soap and glycerine, also broken into small particles, by the bile and the Pancreatic juice, and absorbed as such by the Lacteal vessels.

Fats are the ingredients of the food (either animal or vegetable, or both) of all the living beings. The people who live in cold countries, consume more fats than those living in hot countries. People doing hard physical work, demand more fat than those doing moderate labour.

Carbo-Hydrates are the Starches, Sugars, Celluloses, and Gums. They contain Carbon, Hydrogen and Oxygen; but the Hydrogen and Oxygen exist in very big proportions forming water. Starch constitutes the chief portion of the seeds of various cereals and tubers.

Sugars are of various kinds—Cane Sugar, Glucose or Grape Sugar, etc.

Carbo-Hydrates closely resemble the fats in the property of maintaining the animal heat and production of energy; also the production of fatty tissues. The poor people who cannot afford taking sufficient quantity of fat due to its high price, replace it by a voluminous intake of Carbo-Hydrates. But by completely cutting off fats from the diet, a man loses vigour and health very rapidly.

So to maintain proper health, a man must take both fats and Carbo-Hydrates.

Vegetable Acids play a very important part in preserving the health of a man. The most useful acids among them worth mentioning are the following :—

Citric Acid found in Oranges, lemons, etc.

Malic " " " Fruits as apples, pears, etc.

Tartaric " " " Liches.

Oxalic " " " Rhubarb and similar roots.

Acetic " " " Substances obtained by the distillation
of wood. It is used in the form of
vinegar.

Mineral Salts.—Sodium Chloride or common salt, Phosphate of lime, Potash, Magnesium, Soda and a small quantity of Sulphur in the form of sulphates, also Iron and Copper are essential for the growth and repair of the different tissues of the body.

Water.—We ought to remember that the human body in the average consists of sixtyfour parts of water. A portion of it is produced by the oxidation of the Hydrogen present in the tissues. The bigger quantity of it is derived from the water contained in the solid food, as well as the plain water drunk. The utility of water in the human system is to keep the food in solution, to convey it to the different parts of the body, to help the excretion of the effete materials (produced as the result of body metabolism) through the kidneys, bowels and skin ; also to balance the body temperature by evaporation from the skin and through the lungs.

Nutritive value of the food.—Every process of our body such as the movement of the arm or the foot, the beating of the heart, the secretion of the gastric juice, or the swallowing of a lump of food, is attended with some manifestation of energy. This energy is shown either in mechanical labour or production of heat. Energies are of two kinds. Kinetic and Potential. The

former is the energy for movement, and the latter is that for reserves. The potential energy may cause motion, but it is suspended in its actions, and just like the coiled watch spring, it may cause motion when it is put into action.

The measurement of the potential energy is the amount of heat that can be obtained by complete combustion of the chemical constituents of the food representing that energy. The amount of energy that can be obtained from a substance of a given weight, is proportional to the heat given out during its combustion. The standard of the measurement of heat is termed a "Calorie" or heat unit, that is, the energy required to raise 1 gramme of water 1°C.

The caloric requirements of a man for 24 hours, depend on the size of the individual, and on the variations in his activities. If a man of average size and weight takes complete rest in his bed, continually for 24 hours, he requires about 1700 calories to maintain his body temperature, his heart beats, his respirations, etc. Further requirements of calories depend upon his activities (his muscular exertions during those 24 hours).

A sufficient intake of food material is necessary for every man of average size and weight to produce that 1700 calories, plus an extra amount of heat units necessary to compensate the heat loss, due to his muscular exertions during one whole day and night.

An average sized man doing moderate amount of manual labour requires food, sufficient to yield 3100 calories to compensate his daily heat loss. A heavy built strong man doing hard labour, wants food yielding 3500 to 4000 even up to 4500 calories to compensate his daily heat loss.

TABLE SHOWING THE COMPOSITION AND CALORIC VALUE OF VARIOUS COMMON ARTICLES OF FOOD

Food	Weight, gram's	Measure.	COMPOSITION IN GRAMMES			Total Calories	MINERAL CONTENT IN GRAMMES				
			Pro-tein.	Fat.	Carbo- hydrates		Calcium	Iron.	Copper.	Phos- phorus.	Reac- tion.
Almonds	10	10 medium	2.0	6.0	2.0	65	.02390	.00039	.00012	.04150	alkaline
Apple, raw	100	1 " cupful	0.4	0.5	14.2	63	.3070	.00030	.00012	.01200	"
Asparagus, cooked	100	1 " cupful	2.0	3.3	2.2	48	.02500	.00100	.00314	.03900	"
Banana	100	1 medium	1.0	0.0	20.0	84	.00900	.00060	.00021	.03100	"
Beans, butter (boiled)	80	1 " cupful	5.0	0.0	20.0	100	.02700	.00210	.00029	.14400	"
Beans, haricot (baked)	100	3 1/2 table spoonful	6.9	2.5	19.6	129	.05400	...	...	...	"
Beans, Soya (boiled)	80	1 " cupful	11.0	5.0	9.0	125	.08600	.00171	...	...	"
Beetroot, cooked	100	1 " "	2.3	0.0	8.0	40	.02900	.00060	.00010	.03900	"
Brazil nuts	30	4 "	5.0	20.0	2.0	208	...	...	.00042	...	"
Bread, wholemeal (fresh)	40	1 in. slice	3.88	0.36	9.88	98	.02000	.00064	.00016	.07000	acid
Bread, white	10	1 slice	1.0	1.0	7.0	41	.00270	.00009	.00003	.00900	"
Brussels sprouts, cooked	100	1 " cupful	1.0	0.0	3.0	16	.02700	.00110	.00010	.12000	alkaline
Butter	10	2 tea spoonful	0.01	8.5	0.0	77	.00150	.00002	...	.00170	...
Cabbage, raw	50	1 " cupful	0.8	0.15	2.8	16	.02750	.00055	.00003	.01950	alkaline
Carrots, cooked	100	1 " "	1.0	0.0	6.0	28	.05600	.00060	.00008	.04600	"
Cauliflower, cooked	100	1 " "	2.0	0.0	4.0	24	.12300	.00060	.00014	.06100	"
Celery hearts	100	1 stalks	1.1	0.1	3.3	19	.07800	.00050	.00001	.03700	"
Cheese, Cottage	100	1 1/2 " cupful	2.09	1.0	4.3	100	.30000	.00090	...	.08300	...
Cheese, Cheddar	100	4 1/2 in. cubes	27.7	36.8	4.1	460	.93100	.00130	.00018	.08300	...
Cream (twenty per cent.)	100	7 1/2 table spoonful	3.0	20.9	5.0	212	.08600	.00022	...	.06700	...
Dates, dried	25	4 small	0.5	0.7	19.6	87	.01300	.00060	.00013	.01100	alkaline
Egg, entire	50	1 medium	6.0	5.2	0.0	71	.03250	.00150	.00012	.09000	acid
Figs, dried	30	2 small	1.3	0.0	22.3	94	.04860	.00090	.00011	.03480	alkaline
Fish, Cod, Haddock	100	3 oz.	16.5	...	...	66	...	...	...	...	acid
Flour, wholemeal	10	1 table spoonful	1.4	1.9	7.2	36	.00300	.00025	.00004	.02380	"
Gluten Bread	20	1 thin slice	4.8	0.2	7.0	49	...	...	...	...	"
Grapes	100	24	1.3	1.6	19.2	96	.01900	.00030	.00009	.03100	alkaline

[illegible]

Table showing the time required for the digestion of several common articles of food in the stomach.

	II. M.		H. M.
Apples, Mellow, Raw	2 0	Hash, meat and Vegetables, warmed	2 30
Apples, Sweet, mellow, raw	1 30	Milk, boiled	2 0
Apples, Sour, hard, raw	2 50	Milk, raw	2 15
Barley, boiled	2 0	Mutton, fresh, boiled	3 0
Beans, Pod, boiled	2 30	Mutton, fresh, Broiled	3 0
Beef, dry, roasted	3 30	Mutton, fresh, roasted	3 15
Beef, Fresh, lean, rare, roasted	3 0	Lamb, fresh, boiled	2 30
Beef, Fresh, lean, fried	4 0	Oysters, fresh, raw	2 55
Beef, old, hard, salted, boiled	4 15	Oysters, fresh, roasted	3 15
Beefsteak, Broiled	3 0	Oysters, fresh, stewed	3 30
Beets, Boiled	3 45	Pork, Fat, lean, roasted	5 15
Bread, Corn, baked	3 15	Pork, Recently salted, fried	4 15
Bread, Wheaten, fresh, baked	3 30	Pork Steak, Broiled	3 15
Butter, Melted	3 30	Potatoes, Irish, baked	2 30
Cabbage, Head, raw	2 30	Potatoes, Irish, boiled	2 30
Cabbage, Head, Boiled	4 30	Rice, boiled	1 0
Carrots, Boiled	3 15	Sago, boiled	1 45
Codfish, Cured, dry, boiled	2 0	Salmon, Trout, fresh, boiled	2 30
Cheese, Old, strong, raw	3 30	Soup, Barley	1 30
Corn Cake, Baked	3 0	Soup, Bean, boiled	3 0
Ducks, Domestic, roasted	4 0	Soup, Oyster, boiled	3 30
Ducks, Wild, roasted	4 30	Soup, Chicken, boiled	3 0
Eggs, Boiled, hard	3 30	Soup, Marrow, bone	4 15
Eggs, Fresh, Fried	3 30	Soup, Mutton, boiled	3 0
Eggs, Fresh, soft, boiled	3 0	Soup, Mutton, fresh, broiled	3 0
Eggs, Fresh, raw	2 0	Tapioca, Boiled	2 0
Eggs, Fresh, whipped	1 30	Turkey, Domestic, boiled	3 25
Fowls, domestic, broiled	4 0	Turkey, Domestic, roasted	3 30
Fowls, domestic, Roasted	4 0	Turnips, Flat, boiled	3 30
Custard, baked	2 45	Veal, Fresh, broiled	4 0
Goose, roasted	3 30	Veal, Fresh, fried	4 30
Green corn & Beans, boiled	3 45	Venison Steak, Broiled	1 35

A mixture of foods requires more time for digestion than a single food. As a matter of fact, the Stomach only gets rest when it has digested the food, the digested stuff proceeded downwards into the intestines, leaving the stomach empty ; and ready to receive another meal. During the transition period between the emptying of the Stomach, after the digestion, and the next ingestion of food into it, a peculiar sensation is felt, this is "Hunger" (craving for food). A man should never stuff his stomach until he feels hungry.

When a mixed food is taken, the best procedure is to allow full 5 hours for the stuff to get digested, before a second meal is allowed. It is a sin to overlap a new meal upon the undigested remains of a previous one. It causes indigestion, acid stomach, fermentation, diarrhoea, constipation, etc.

VITAMIN

One of the greatest achievements of medical science during the last thirty years is the discovery of Vitamins. Sailors who used to live on preserved foods during some long voyages in the sea, often used to get scurvy, the prominent symptoms of which were swelling, bleeding, and ulceration of the gums, loosening of the teeth, extreme muscular weakness, also swollen and painful joints. But when those sailors came to some ports after the long voyage, and were fed on plenty of fresh lemons, oranges and fresh vegetables, those symptoms disappeared and they recovered.

Sometime in 1880, Beri-Beri developed in the Japanese Navy, when the men were fed with polished rice. But later on, when they were fed with unpolished rice and fresh vegetables, they recovered.

Dr. Casimer Funk isolated a minute crystalline substance from the pericarp (the layer between the husk and the rice grain) of the rice polishings. Two pounds of these polishings could yield half a grain of the crystal. This crystalline substance he called Vitamin, from Vita and Amin. Vita means life, and Amin meaning a substance analogous to Nitrogen.

The intake of these Vitamins which those special food stuffs contain, controls the various functions of the human body.

There have been discovered six different types of Vitamins up till the present day, but there are perhaps many more existing in the constituents of our daily foodstuffs, and in many different conditions which will be discovered in the future to enrich the medical science, by eminent physicians and scientists who have been diverting their whole-hearted attention to this subject.

The six different kinds of Vitamins that have been isolated up till now are the following :—

1. Vitamin A.—Fat soluble—as they are soluble in fats.
2. „ B₁. Water soluble—as they are soluble in water.

- | | | |
|----|--------------------------|----------------|
| 3. | Vitamin B ₂ . | Water soluble. |
| 4. | „ C. | Water soluble. |
| 5. | „ D. | Fat soluble. |
| 6. | „ E. | Fat soluble. |

Vitamin A.—

Solubility.—In fat.

Present in—Butter and in Liver oils of fishes and mammals.

Utility.—(a) It promotes appetite ; helps digestion, nutrition and growth of animals, especially in their early lives. Administration of diet sufficient in Vitamin A in later life, does not help the growth of animals already grown stunted due to Vitamin A-deprivation in early life.

(b) It keeps the mucous membrane of the Nasopharynx and the Lungs healthy.

(c) It guards against infection.

(d) Want or deficiency of Vitamin A in food, retards the formation of dentine. Consequently, the tooth becomes soft, and it decays early.

Stability.—It is gradually destroyed by exposure to air, drying and cooking.

Vitamin B₁.—

Solubility.—In water.

Present in—Cereals, and especially in yeast and rice polishings.

Utility.—(a) It promotes greater power of resistance of the teeth to infective bacteria.

(b) It affords protection against Polyneuritis (beri-beri).

(c) The deficiency causes indigestion, constipation, muscular and nervous fatigue and defective development.

(d) Total lack in the food causes Beri-Beri,

Stability.—A greater portion of this vitamin gets dissolved in water used in cooking the vegetable containing it. Its efficiency is lost after exposure to very high temperature. Ordinary boiling does not destroy it.

Vitamin B₂.—

Solubility.—It is water soluble.

Present in—In yeast and in mammalian liver.

Utility.—(a) The growth of animals depends on the existence of Vitamin B₂ in the diet, although all the other vitamins are supplied, the young animal will cease to grow, if Vitamin B₂ is wanting in the diet.

(b) It affords protection against Cancer and Pellagra.

Stability.—It can stand very high temperature.

Vitamin C.—

Solubility.—It is water soluble.

Present in.—Lemons, oranges, germinating peas, etc.

Utility.—(a) It helps the assimilation of calcium in food.

(b) It prevents scurvy.

(c) It prevents infection.

(d) Insufficient intake of Vitamin C causes low vitality, shallow complexion, pains in the joints, and decay of teeth.

(e) Total lack of Vitamin C in food causes Scurvy.

Stability.—It is destroyed by heating or drying.

Vitamin D.—

Solubility.—It is fat soluble.

Present in—It is present in cod liver oil in very large quantity.

Utility.—(a) It helps growth.

(b) Vitamin D controls the calcium and phosphorus metabolism. Its administration corrects the defect in calcium and phosphorus balance in the body.

(c) Due to defective calcium metabolism, retention of calcium and phosphorus in the body becomes low. The bones become deficient in lime, and Osteomalacia, Rickets, *etc.*, result. Dental caries, bad dentition and the allied periodontal diseases are manifested.

(d) During pregnancy and postnatal period, the patient should be supplied with plenty of Vitamin D in the food.

Vitamin E.—

Solubility.—It is fat soluble.

Present in—It is present in profuse quantity in wheat embryo.

Utility.—(a) It increases lactation in the female.

(b) It increases productive power.

(c) Lack of Vitamin E in the diet causes sterility in the male, and failure in childbearing in the female.

(d) Proltracted deficiency of Vitamin E in the food causing sterility in the male, cannot be cured by subsequent administration of the Vitamin in large quantity. But in the female, the child-bearing power can be regained after sufficient supply of Vitamin E.

Stability.—It stands a very high temperature.

When the vegetable containing water soluble Vitamin is cooked, the Vitamin gets extracted from that Vegetable stuff, and gets dissolved into the soup. Now if the soup is thrown away,

the solid vegetable portion left out, is much less in its Vitamin properties. Cooking diminishes, and sometimes destroys the food value of many diets. The more artificial a food, the less is its food value.

Sources of Vitamin in food stuffs.—The chief source of Vitamin in foodstuffs is the "Sunlight". The vegetables grow in the Sunlight, from which they store in the different kinds of Vitamins. Animals who feed upon these vegetables, utilise the vitamins for their life (which is as a matter of fact a struggle for existence), by fighting out the infective bacteria with which the world is infested, also acquire their growth and rejuvenating power. The fishes acquire in abundance the life giving Vitamin D, because they feed upon the mosses and sea-weeds.

The Vitamin that we acquire by feeding upon fresh vegetables, are the firsthand and pure Vitamins which are of much more food value than meat and fish which, as a matter of fact, maintain their food value (Vitamin) in a secondhand way.

People living upon fresh and raw vegetables, acquire more Vitamin from their food, and consequently are more vigorous, healthy and long lived, than people living on artificially prepared and tinned foods.

Table showing the presence in small, moderate and large quantities, also the total absence of Vitamins, in some common articles of food.

FOOD	VITAMINS					
	A	B ₁	C	D	E	B ₂
Almonds ...	*	**
Apple (raw) ...	*	*	**	*
Banana ...	*	*	**	*
Barley	**	...	*	...	*
Beet greens (cooked) ...	**	*	*	*
Beetroot	*	*	*
Bread (whole-wheat) ...	*	*
Butter ...	**	...	**	...	*	**
Cabbage (raw) ...	*	**	**	...	*	*
Cabbage (cooked) ...	*	*	*	*
Carrots (raw) ...	**	*	*	...	*	**
Carrots (cooked)	*	*
Cauliflower	*	*
Celery	*	*
Cherries (fresh) ...	*	*	*
Dates (dried) ...	*	*	...	*	*	**
Egg yolk ...	**	*	*	*	...	*
Grapes ...	*	*	*	*
Grape fruit ...	*	*	*	*
Lemon ...	*	*	*	*
Lentils ...	*	*	*	*	*	*
Lettuce ...	**	*	*	*	...	*
Milk (whole) ...	**	*
Oatmeal porridge ...	*	*	*	*
Olives (ripe) ...	*	*	*	*
Orange juice ...	*	*	*
Orange marmalade ...	*	*	*	...	*	*
Peas (tinned) ...	*	*	*	*
Peaches (tinned) ...	*	*	*	*
Pineapple (tinned) ...	*	*	*	*
Potato (baked) ...	*	*
Prunes (dried) ...	*	*	*
Raspberries (fresh)	*
Rice, unpolished (cooked) ...	*	*	*	*
Soup, Cream (sweet corn) ...	**	*	*
Soup, Cream (celery) ...	**	*	*	*
Soup, Cream (tomato) ...	**	*	*	*	*	*
Spinach (cooked) ...	*	*	*	*
Strawberries (fresh) ...	*	*	*	*
Tomatoes (fresh) ...	*	*	*	*
Tomatoes (tinned) ...	*	*	*	*
Turnips white (cooked)	*
Walnuts, English ...	*	*	*	*
Wheat (cooked) ...	*	*	*	...	*	*
Watercress ...	**	...	*	...	*	*

*Present in Small quantity.

**Present in Moderate quantity.

***Present in
very large quantity.

CHAPTER I

DISEASES OF THE ORGANS OF DIGESTION

The most important system, and the diseases of which every body has to pay the most attention, is the Digestive system. This system consists of a long muscular tube, the inner surface of which is lined with mucous membrane, and the ducts of some glandular organs opening into it. It begins at the mouth, and terminates at the anus. It consists materially of many different parts, the functions of which vary from each other. The disease in any small portion of these parts causes serious troubles, and as a matter of fact, upsets the whole digestive system, and finally, the result tells upon the whole physical frame, causing degeneration in every other tissue, and cuts short prematurely the normal span of life.

DISEASES OF THE MOUTH

A. Stomatitis.

B. Pyorrhoea Alveolaris.

STOMATITIS - (catarrhal)

Causes.—Chemical or mechanical irritation. Chemical, *e.g.*, contact with strong alkalies or acids. Mechanical irritation, *e.g.*, presence of broken or carious teeth, want of cleanliness of the teeth, the particles of food decomposing within or between the crevices of the teeth.

Symptoms.—It commences with a sensation of soreness in the mouth. The gums swell, and bleed, the teeth become loose, blisters and later ulcers appear on the gums and the hard palate, extending as far as the soft palate.

Treatment.—When acute, find out the cause. If due to any mechanical irritation, *e.g.*, broken or carious teeth, remove them.

and use antiseptic lotions, *e.g.*, Condyl's Fluid one part with hot water seven parts, or Listerine 20 minims in a cupful of hot water, as a gargle twice daily. The affected portion may be swabbed with Hydrogen Peroxide, and finally gurgled with boiled hot water. After the cleaning, apply Boro-Glycerine.

Diet.—Milk combined with farinaceous foods.

As soon as the acuteness and tenderness have subsided, start using antiseptic tooth pastes with a soft tooth brush.

Pyorrhoea Alveolaris.—(Pus in the Gum). The healthy condition of the teeth depends not only on the general good hygienic condition of the bowels, but on the good condition of the general health. Carious teeth, diseased stumps, accumulation of tarter upon the teeth, the accumulation of decomposed food particles between the teeth, and between the teeth and the gum, also favour the growth of several kinds of septic organisms. Pus is formed by the side of the teeth in pockets. This pus is constantly taken into the stomach with the saliva, and gets absorbed into the system. This process lowers the resisting power to invasion by bacteria and germs in general, and thus becomes a definite cause of the troubles, namely, Chronic Rheumatoid Arthritis, Anaemia, Conjunctivitis, Neurasthenia, etc.

Treatment.—General hygienic condition of the mouth should be maintained. The tarter should be removed periodically by proper scraping. Antiseptic tooth brushes should be used regularly. The best type of home-made tooth brushes as used by the Indians, are small sticks made of the thin branches of the "Neem Tree," common throughout India. These are called "Dantans". They are made by chewing one end of the fresh small stick about 9 inches long, and the rough broom-like end thus made, is used as the brush. A fresh stick being used every time. These may be used without any antiseptic tooth paste. After thorough brushing of all the teeth for about fifteen minutes, the mouth should be washed thoroughly with clear water.

Solid foods should be properly chewed before swallowing.

Exercise.—As soon as the acute inflammatory condition has passed off, bits of sugarcane cut into lumps, should be slowly and carefully chewed once a day, and then the mouth should be washed with hot water. This gives proper exercise to the teeth and the gums, also properly cleanses the teeth.

For improvement of the general physical condition, the following exercises are recommended :—

Exercises Nos.—1, 2, 3, 4, 5, 14, 15.

To remove constipation, and improve digestion, the following exercises are very useful :—

Exercises Nos.—9, 10, 10(a), 17, 18, 19, 24, 29, 42 and 42(a).

DISEASES OF THE TONSILS AND THE PHARYNX

Diseases of the Tonsils.—(Tonsillitis). It is a disease of the tonsils which are masses of lymphoid tissue, situated one on each side between the anterior and the posterior pillars of the fauces. In these faucial tonsils, the lymphoid tissues have got follicles consisting of special arrangements of cells and reticulæ. They show deep fissures or crypts. Numerous types of bacteria, *e.g.*, Streptococci, Staphylococci, Pneumococci, Colon Bacilli, Micrococcus, Catarrhalis, etc., are found in these crypts, even in healthy conditions. The utility of the existence of the tonsils is still a debate. Where the tonsils are infected, the infection may be transmitted to the cervical lymphatic glands.

Follicular Tonsillitis.—It is sometimes associated with infectious diseases, *e.g.*, Diphtheria, Syphilis, Acute Rheumatism, etc. It is mostly common in people living in ill-ventilated places. It might be due to the sudden or periodical increase of virulency of the bacteria living in the Tonsillar crypts of people having low resisting power.

Treatment.—Free evacuation of the bowels is necessary. In acute cases, medicines—Quinine and Perchloride of Iron internally, also applications of Argent. Nitras are useful.

In the sub-acute and in chronic cases, steps should be taken to improve the general constitution.

Diet.—In the acute stage, milk with diluted farinaceous foods.

Hygiene.—Sufficient exercise in the open air is imperative, if the weather is comparatively dry. Sleep in rooms well-ventilated, but avoid draughts.

Exercises recommended.—During the sub-acute stage :—

- Group I. Exercises Nos. 1 and 2 for the neck,
Exercise No. 39 (especially for breathing),
Exercise No. 9,
for a fortnight.
- Group II. Exercises Nos. 1, 2, 38, 39,
Exercises Nos. 5, 44,
Brisk walk after the exercise, with Group I,
for a fortnight,
- Group III. All the above figures and in addition,
Exercises—Nos. 14 and 15—followed by
brisk walk, or if possible, running.

People susceptible to tonsilitis, should be very careful about their baths and changes. During the cold weather, tapid bath in a covered space, following the constitutional exercise, is recommended. The body should never be allowed to get chilled after the exercise. Clothes should be changed just after the bath, having a well rub down, with a dry towel. During the hot weather, a few minutes' rest is recommended, before the bath which may be in cold water, but never in the open.

CHRONIC PHARYNGITIS

Causes.—It is a common effect of repeated attacks of acute Pharyngitis. It may arise from excessive smoking of tobacco, too much use of alcohol, also excessive use of voice.

Symptoms.—The mucous membrane is reddened, the veins therein are dilated, and in several cases, there are numerous small grey elevations scattered over the Pharynx. These elevations are

the enlarged follicles or mucous glands. There is almost always a sort of hawking cough, and increased secretion from the mucous membrane. In other cases, the surface is dry, and there is difficulty, and feeling of pain, during swallowing.

Treatment.—Paints of Tinct. Ferri. Perchlor and Glycerine, and gurgles of antiseptic lotions with Pot. Permanganas or Listerine may be used.

Exercises recommended.—Exercises Nos. 1, 2, 3, 4, 5, 44, 9, 14, 15.

In addition to these exercises, the patient should undergo the following manoeuvres.

He should sit on a chair, resting his hands on the knees as shown in fig. 103, but the chin raised, and eyes front, while a physical instructor holds the glass funnel of an Oxygen cylinder in front of his nose. The patient will now inhale, and exhale for some time (1 minute to 5 minutes). Next, after an interval of 3 minutes he will do the following exercise.

Sitting on a chair as before, the patient will now drop his arms on his sides, and lift his arms simultaneously at the shoulder level (5 to 100 times), taking in deep breath with every movement, while the physical instructor holding the Oxygen funnel as in the previous exercise. The liberation of the Oxygen from the cylinder should be pretty slow, and it should be well diluted with the atmospheric air, before it is inhaled.

DISEASES OF THE STOMACH

Gastric Indigestion.—It is a sort of functional disorder of the stomach, more commonly called Dyspepsia. It may be due to several causes :—

1. Imperfect solution of the food material into the stomach, by the gastric secretions.
2. Delayed transmission of the churned food material into the duodenum. The result being that the

stomach is kept distended for a longer period than usual, retaining the undigested food stuff stale in the gastric cavity, upsetting the nervous mechanism of the stomach ; and thus delaying, and materially hampering in the long run, the absorption and assimilation of nutrition from the food taken.

3. Ingestion of an excessive quantity of food, causes gastric irritation ; and a chronic habit like this causes inflammation of the mucous membrane of the stomach wall.
4. Improper quality of food like big quantity of strong acids, alkalies, alcohol or ice, causes inflammation of the gastric mucous membrane.

Diseases of the stomach may be classified as following :—

A. Acute Gastric Troubles.—

1. Acute Dyspepsia without tenderness on pressure.
2. Acute Gastritis with tenderness on pressure.

B. Chronic Gastric Troubles.—

(a) Without much local pain and tenderness on pressure.—

1. Chronic irritable Dyspepsia (Acidity).
2. Chronic Dyspepsia (Atonic).
3. Gastric Neuralgia (Gastralgia).

(b) With much local pain and tenderness on pressure.—

1. Simple ulcer of the stomach.
2. Cancer of the stomach.
3. Chronic Gastritis.

(c) Dilatation of the Stomach.

ACUTE DYSPEPSIA

It is commonly called "bilious attack" occurring suddenly in a previously healthy subject.

Causes.—1. It is often found in persons used to high living.

2. Occasionally, in other classes of people, due to errors in diet.

3. Too big a meal, taken especially following a fatigue.
4. Excess of alcohol or ice, taken especially in an empty stomach.
5. Intake of a big quantity of many other articles which the subject cannot usually stand.

Symptoms.—1. A feeling of sudden pain and distension in the region of the stomach, with slight tenderness on pressure.

2. Nausea and vomiting.
3. Headache, a sense of depression, and coated tongue.
4. Constipation in some cases.
5. Scanty urine.

Diagnosis.—It simulates acute Gastritis, in which the constitutional symptoms are more marked, and the duration of the malady is much longer. Also the local tenderness is considerably marked.

In cases of irritant poisoning, the symptoms come on much more suddenly, and there is very urgent vomiting.

Treatment.—If there is much pain, try to vomit out the ingested stuff, by drinking a pint of saline water (common salt one dram, and water one pint), or tickle the fauces. After vomiting, give the stomach rest for some hours with small drinks of plain water if thirsty, followed by a dose of Castor oil, and complete rest in bed for a day or so.

ACUTE GASTRITIS

It is an inflammation of the stomach coming on suddenly, causing much disorder in the process of digestion.

Causes.—1. Excessive ingestion of normal food.

2. Errors in diet, or intake of decomposed meat.

3. Irritant poisons, *e.g.*, Arsenic, Phosphorous, etc.
4. Some constitutional diseases, *e.g.*, Gout, etc.

Symptoms.—Severe pain or feeling of distension is experienced in the Epigastrium, just after the ingestion of food. There may be vomiting, slight feverishness, thirst, headache, general depression and marked prostration. There may be diarrhoea coming on in a day or two.

Treatment.—Complete removal of any irritant present in the stomach, by mild emetics, and perfect rest for 24 to 48 hours. If there is marked constipation, that should be removed by a dose of castor oil ; or 2 to 3 grains of Calomel at bed time, followed by a good dose of saline in the next morning. In case of severe pain in the Epigastrium, Bismuth and Opium may be administered after the purgative has worked. Hot fomentations are very useful. Bland diet, *e.g.*, Barley water or milk for a day or two is essential.

As soon as the local symptoms have passed off, but the bowels remaining irregular (usually constipated), the following set of exercises should be attempted.

Exercises.—Group I. Exercises Nos 9, 10, 22, 23, 24 and 25.
 " II. " " 17, 18, 19, 20, 42 and 42(a).
 " III. " " 1, 2, 3, 4, 5, 14, 15 for
 general physical development.

After practising Group No. I and II for about three weeks, the patient should attempt all the three Groups together.

CHRONIC GASTRIC TROUBLES

These are of two types :—Functional and Organic.

Functional Types.—1. Atonic Dyspepsia.

2. Gastralgia.

3. Acid Dyspepsia.

Organic Types.—1. Simple ulcer of the stomach.

2. Chronic Gastritis.

3. Cancer of the stomach.

Atonic Dyspepsia.—There is formation of gas in excessive quantity in the stomach, which is really a marked feature. It is common in anaemic persons, in whom the stomach is wanting in its functional power as regards both secretion and muscular contraction. For want of secretion of an ample quantity of Hydrochloric Acid (which is antiseptic, and so kills all the germs in the food), there sets in a soil of decomposition of the food materials. The resultant gas distends the stomach, augmented by the lesser contractility of its muscular structure. The secretion of Pepsin is usually normal.

Symptoms.—Pain and distress come on almost immediately, or shortly after food. There is feeling of distension. The trouble is largely aggravated by tea, coffee, pastry, green vegetables or other food not easily digestible. The pain is felt in the Epigastrium, in the back, or shooting up to the left shoulder; or there may be no definite pain, but only a sense of weight or distension. There is no marked tenderness on pressure, and the pain is often relieved after few eructations of wind. Nausea and vomiting are sometimes present. The appetite is generally diminished. The tongue is broad, flabby and indented by the teeth. There is troublesome constipation. In some cases, these undigested food materials are pushed down to the intestines; there they arrive improperly prepared as it were, for the final digestion and absorption, consequently there occurs occasional diarrhoea in the subject.

Treatment.—The treatment would be really scientific, if the exact condition of the secretions and the motor power of the stomach could be ascertained by examinations of the vomited matter after the last meal. If there is less secretion of Hydrochloric Acid, a few drops (5 to 15 drops) of dilute Nitro-muriatic Acid may be taken about half an hour after food. If the motility of the stomach is deficient, Liquor Strychnine Hydrochloride 2 to 5 drops may be tried in a similar way. But before the medical aid is sought for, the best process is to sip a glassful of hot water with a few grains of Sodii Bicarb. added into it, one hour before the meal. This will stimulate the mucous membrane of the stomach, dissolve the

mucous, and as a matter of fact, wash the stomach down, also make it ready to receive the next meal. A dose of carminative mixture before food helps the digestion in these cases.

Diet.—The diet should never be voluminous. It should be very carefully regulated, also given in small quantity at a time. The intervals between the meals should be long, so that the first meal may get sufficient time to be digested, and the stomach will be able to empty its contents fully. Too big a quantity of starchy food is contra-indicated. Light and stimulating meat soups in moderate quantity, should be the proper diet for this type of patients.

Exercises.—Group I. Exercises Nos.—1, 2, 3, 4, 9, 10, 17, 18,
19, 20, 5, 44, 14, 15.
" II. " " 10(a), 27, 29, 42, 42(a).

The first group should be practised for a fortnight. Then the second group should be attempted in addition to the first group.

GASTRALGIA

It is a sort of Neuralgia of the stomach. There might be congestion of the mucous membrane in some cases, but there is no change in the muscular structure or alteration in the secretion of the gastric glands.

Symptoms.—1. A sort of acute or burning type of pain is felt in the Epigastrium. This pain is usually relieved by pressure. It begins almost immediately after taking the food; but in some cases it may be felt when the stomach is empty. In other cases the pain may come on when the patient has just started taking his food. Again in some cases, the pain is relieved by food. No difference is found in taking different kinds of food.

2. Vomiting is very rare.
3. Neurotic people who have Neuralgia in other parts of the body, may suffer from this trouble.

Causes.—There is no restriction in the age or the sex of the subject. Neurasthenia, Anaemia, Gout, Alcoholism or some such constitutional disorders may be the cause of the trouble.

Treatment.—During the acute period, hot fomentations on the Epigastrium will give some relief. Very careful administration of opium, and arsenic in very small doses may be tried. But special attention to the constitutional improvement will do a world of good to the patient.

Diet.—As neither the quantity nor the quality of the food ingested into the stomach is responsible for the causation of Gastralgia, the patient should pay more attention to the improvement of his general physical condition than his stomach alone. The diet should by no means be indiscriminate; on the other hand it should be regular, also moderate in quantity as well as in quality.

Better hygienic conditions should be adopted. Healthy associations should be encouraged. Change of climate and environments are desirable. Where constitutional disorders are the causes of the trouble, the individual disorder should be dealt with accordingly, before any attempt is made to treat Gastralgia separately.

Exercises.—Group I. Exercises Nos. :—9, 10, 17, 18, 19, 27.

„ II. Exercises Nos. :—1, 2, 3, 4, 14, 15, for
the general constitution.

After exercise, a brisk walk also running are recommended.

ACID DYSPEPSIA

It is a form of chronic indigestion due to the hyper-secretion of hydrochloric acid in the stomach. There is no change in the amount of pepsin secreted. According to some medical authorities it is regarded as a sort of Neurosis of the stomach. Others consider it to be a form of chronic inflammation of the gastric secretory glands, caused by the local irritation from alcohol, injudicious food, or decomposition of retained food materials in the stomach.

Symptoms.—A sort of burning sensation is felt in the stomach one or two hours after food. Sometimes the pain is very severe,

gnawing and intense. There is no tenderness at the region of the stomach on pressure. It is usually relieved by taking food. There are usually acid eructations, which may be so acrid as to cause sore throat. Sometimes there is increased appetite.

Causes.—Highly spiced food, excess of alcohol, overloading the stomach, and sometimes taking of food at very irregular and long intervals, may cause this trouble. It is usually met with in young adults.

Treatment.—In ordinary acid Dyspepsia, a tumblerful of hot water sipped two or three hours after meals, will give much relief. But in severe cases, big doses of Sodii Bicarb or Creta Preparata should be given when there is much acid eructations.

Diet.—Diet plays an important part in the treatment of acid Dyspepsia. Strictly meat diet, *e.g.*, meat cakes prepared with muscle fibres of meat, fish or poultry, leaving all the gristle and sinews, lightly fried, should be given. Very small quantity of fluid should be drunk during the meals. But plenty of water may be drunk one hour before, or two hours after the meal.

Exercise.—The following exercises are recommended for the general physical improvement which is the chief aim in the treatment of acid Dyspepsia. Exercises Nos. :—3, 4, 5, 8, 9, 14, 15. Brisk walk and running are also recommended after these exercises.

Some special exercises

Exercises Nos. :—10, 17, 18, 19, 20, 27 should also be practised.

SIMPLE ULCER OF THE STOMACH

Simple ulcer of the stomach occurs in two forms—Acute and Chronic.

Causes.—It occurs more frequently in women than in men, and is very common in young women between 16 and 30 years. The chronic ulcer is common in men between 35 and 60 years. The ulcer is called simple, *i.e.*, non-malignant as to distinguish it

from the Cancerous Ulcer. It is usually single, situated on the posterior wall of the stomach near the Pyloric orifice and the lesser curvature.

Symptoms.—Tenderness, and intense pain of a boring character limited to one spot near the Epigastrium, aggravated directly after the ingestion of food, and is relieved by abstinence or careful diet. Vomiting occurs very shortly after food, and the pain is relieved after the vomiting. There is an excess of hydrochloric acid in the contents of the vomited matter. Haematemesis is occasionally present, and which may be sometimes profuse in quantity. The faeces is usually black, due to altered blood present in the stool. The appetite is normal, or it may be increased. Constipation is generally present. In some cases, there may be no prominent symptom, but haemorrhage and perforation take place without any warning.

Diagnosis.—The ulcer of the stomach can be distinguished from the duodenal ulcer, as in ulcer of the stomach, the pain is aggravated during meal time. Whereas in duodenal ulcers, the pain ceases immediately after the meal, but coming on again after an hour or an hour and a half later.

Treatment.—The stomach should be given rest as much as possible. The patient should be kept in bed for about a month, and afterwards may be allowed to move about very slowly and cautiously. During the period of pain and vomiting which may be frequent, food should be given entirely by the rectum. But as the painful symptoms disappear, food may be given per mouth, in the form of well diluted milk an ounce or two every three hours. If this does not well agree, then the milk may be diluted with lime water, or it may be peptonized. The quantity of the milk may be increased from one to two pints in course of 24 hours. In the third week the milk may be well diluted with arrowroot, powdered barley or ground rice. Meat solutions may be added later on. Solid food should not be given before all the symptoms disappear, *i.e.*, not before two or three months. Vegetables and fruits should be avoided throughout the period of treatment.

As regards medicine.—If the pain is not relieved by conservative dietary. Tincture of Opium 5 to 10 minims, or Liquor Morphine Hydrochloridi 10 to 15 minims, may be administered. But as soon as the active symptoms disappear, the opium treatment should be discontinued. 20 to 30 grains of Bismuth Carbonate may be given, suspended in mucilage with 2 or 3 ounces of water before breakfast. The hyper-acidity could be relieved by 30 or 40 grains of Sodii Bicarbonas with an ounce of tapid water.

As regards diet.—The following points should be observed very strictly by the patient, after the healing of the gastric ulcer :—

1. Skins of fruit, whether raw or cooked, raisins, currents, lemon peel in cake, nuts and all unripe fruits should not be eaten.
2. Raw vegetables, pickles or salads should be avoided. Green vegetables, if taken at all, must be passed through a sieve, and mixed with butter. Oatmeal should be avoided, but if it is taken at all, should be made with the finest oatmeal.
3. Condiments or sauces such as vinegar, lemon juice, mustard, pepper and chutneys should be avoided as much as possible. Tough meat, salted fish, meat soups and pork should be very strictly avoided.
4. Plenty of butter should be eaten ; also a tablespoonful of olive oil should be taken before each meal. No medicine in the form of pills or tabloids should be taken. The food should be eaten very slowly, and masticated thoroughly. Smoking and alcohol should be strictly avoided. The teeth should be attended to, at least twice a year.

Exercise.—No exercise should be taken during the presence of any active symptom of ulcer of the stomach, such as vomiting of blood, or pain. After the healing of the ulcer, the patient may be treated for dilatation of the stomach or constipation. Special care should be taken to recommend exercises for the other parts of the

body (free hands preferably) ; avoiding those sudden stretching movements of the abdominal muscles, especially the Rectus Abdominis and the Oblique muscles of the abdomen.

For general improvement of the body, the following exercises should be attempted :—

Exercises Nos. :—1, 2, 3, 4, 5, 44, 11, 12, 15.

A brisk walk should follow these exercises.

CHRONIC GASTRITIS

Causes.—Chronic Gastritis may be the after-effect of an acute attack ; but usually it occurs in patients used to take indigestible, irritating and too hot or cold foods, too much tea, coffee, strong condiments, or alcohol. Heart or liver diseases or malignant growths causing venous congestion of the gastric mucous membrane, are occasionally responsible for this trouble. Defective mastication, irregularity in meals, over work, mental anxiety, prolonged illness, lowering of the nutrition and resisting power, pave the way to chronic gastritis.

Symptoms.—The epigastric region is tender on pressure. There is pain present, but it may not be severe. The pain may be aggravated by the ingestion of food, and it will be felt in the epigastric region, or it may be referred to the back, between two shoulder blades. Frequent nausea, and sometimes vomiting may be present. In chronic gastritis of drunkards, morning sickness is a prominent symptom. The vomited matter usually contains large quantity of mucous. Due to diminished gastric peristalsis the food material remains stagnant in the stomach. The hydrochloric acid is very deficient, and it contains lactic butyric and acetic acids as a result of fermentation. Blood is not generally found in the vomit. There are furred tongue, bad taste in the mouth, constipation also depression.

Treatment.—The first attempt should be to remove the causes which have led to gastritis. The patient should be kept in a healthy surrounding. The meals should be very regular.

Healthy occupations, and regular also systematic physical exercise should be adopted.

Diet.—The food should be as bland as possible, but it should be nutritious. The best diet would be milk, preferably raw. Special care being taken to have strictness for its sterility. Milk diluted with cooked farinaceous foods such as barley, porridge (if with the finest oatmeal), etc., and egg (if it is raw) may be given. But after a time when the symptoms have subsided, fish may be prescribed, and then mutton, beef, potatoes or cauliflowers (in the form of soup), very well boiled, may be given. Fibrous vegetables such as carrots or turnips should be avoided as much as possible. Game birds, pork, veal, oysters should always be avoided.

The bowels should be kept in order, and for that occasional doses of magnesia, sodii sulph, aloes or other laxatives, may be administered. Locally for the stomach, Bismuth Subnitras or Liquor Bismuth Fl. Ammon Citras is effective. Vegetable Bitters, *e.g.*, Calumba, Chirretta or Gentian is of much value. A carminative mixture as the following is very useful—

Re/.

Sodii Bicarb.	.	.	.	gr.	20
Liquor Bismuth	.	.	.	dr.	$\frac{1}{2}$
Tinct. Gentian Co.	.	.	.	minims.	10
Inf. Chirretta	.	.	.	ad oz.	1

One such dose, to be taken twice daily half-an-hour before meal.

Exercise.—Systematic and regular exercises like the following are recommended :—

The chief aim is to improve the general strength of the body.—For general muscular development Exercises Nos. :—3, 4, 5, 44, 9, 14, 15.

Exercises that will break up the inflammatory products in the mucous membrane of the stomach :—

1. Lie on a table flat on your back, press the stomach with the palm of your right hand, and then make circular

- movements (by the tips of the four fingers), with the hands of a watch for five or six times, increasing up to thirty. Stop for two minutes, and start again, making the movements against the hands of a watch. Very moderate pressure should be applied. Beware of causing inflammation of the mucous membrane of the stomach, by undue pressure.
2. Lying on a table as in the previous exercise, put the tips of your four fingers (the four last phalanges), with slight pressure, shake the stomach region quickly, giving two or three strokes in a second. The pressure will be from the left to the right in quick succession.
 3. To stimulate the cells of the gastric glands, and to help the secretion of the gastric juice,—place the four fingers as in the above exercise. Give vibratory shakings up and down, keeping the tips of the fingers fixed at a place; give about 20 shakings, and then move on towards the right up to the pyloric region. The movements should cover the whole of the stomach region from left to right.

Exercises for the free action of the bowels :—

- (a) The abdominal rectus control as shown in Exercises Nos. 10, 10(a).
- (b) Exercises Nos. 42 and 42(a).

After the above exercises, take rest for three minutes, lying flat on a table. Then the masseur should try abdominal kneadings with moderate pressure for three to five minutes.

CHRONIC DILATATION OF THE STOMACH

In chronic dilatation of the stomach, the non-striated muscular structure of the walls of the stomach gradually loses its elasticity, becomes weak, and eventually leads to a permanent dilatation of that organ.

Symptoms.—Due to the weakness of the muscular structure of the stomach, there is slow and less peristalsis. The food is retained in the stomach, for a much longer period. Residues of the food taken at night, are left in the stomach till the breakfast time the next morning, accompanied by flatulence and vomiting.

Physical Signs.—The stomach region is found swollen, and if the patient is allowed to sit, or stand up, the lower margin of the stomach shows a curve, with convexity downwards and outwards from the lower part of the costal margin, to the right of the middle line, and lower down even to the umbilicus. Occasionally, peristaltic waves pass from the left to the right and downwards across the swollen area, in the form of a small prominence round and hard, about the size of the palm of the hand; starting at the extreme left of the swelling, and subsiding in or about 2 or 3 seconds. Again, another swelling of a similar nature is formed more to the right, for a similar length of time. This symptom occurs spontaneously. It may start when the abdomen is suddenly exposed, or sharply tapped with the finger tips. When the patient is standing, the lower part of the stomach is found to be dull on percussion, and the upper part is tympanitic. A splashing sound is heard on application of a stethoscope when the stomach is shaken.

Vomiting.—The food may be retained in the stomach for three or four days, and then two to three pints of fluid is vomited out at once. The vomit is usually greyish brown in colour, and frothing on the surface. If examined under the microscope, numerous spores of *torula cerevisiae*, *sarcina ventriculi* and *Oppler Boas* bacilli are found. The patient usually suffers from discomfort which is increased as the fermented materials produced from the food stuffs accumulate. He is temporarily relieved after the contents are evacuated.

Causes.—1. Overloading the stomach, irregularity in food, also the excess of gas that is formed in the stomach of the drunkard. These processes lower the circulation. Consequently,



Mr. Ishanitosh Chatterjee

To Major P. K. Gupta.

Dear Sir,

Many thanks to your physical training treatment which has cured me of "dilatation of the stomach" from which I suffered. I got into such a condition that the leading practitioners of Calcutta were compelled to tell my relations that my heart would fail any moment. But it is your physical training which saved me from death, and has picked me up from a precarious condition to my present state of physical improvement, a photo of which I am sending you herewith, will speak of itself.

With best regards,

Shampukar Street,
Calcutta, 24th November 1935. }

Yours obediently,
Sd. ISHANITOSH CHATTERJEE.

(Facing page 18)

the nutrition of the muscles of the stomach wall, and eventually the contractile power of the stomach, as well as the secretory power of the gastric glands are diminished.

2. Obstruction of the pylorus by a scar tissue.

Treatment.—Keep the stomach as empty as possible. The over-distension of the stomach should be relieved by "Lavage". The undigested food, the decomposed fluid and the gas should be got rid of, so any catarrh that may exist will be benefitted.

The process of Lavage.—Take a stomach pump, introduce that end of the tube which has the eye on it, into the stomach, raise the funnel above the mouth level, and pour in water. Depress the funnel, and empty the contents of the stomach by inverting the funnel into an enamel bowl kept at a lower level than the stomach. By this process empty the stomach slowly and entirely of its contents. Now introduce 2 or 3 pints of clear water by the previous method, and so rinse out the stomach completely. Repeat the process till the stuff that comes out, is nothing but clear water. During the washing, the water that is used, should be diluted with Sodii Bicarb. $\frac{1}{2}$ a dram to a pint of water. This Lavage should be done twice daily half-an-hour before meals.

Diet.—The food should be given in small quantity every time, easily digestible and nutritious. Carbo-Hydrate and animal foods should never be given together. Vegetable and farinaceous foods should be carefully avoided. To prevent fermentation, Acid Carbolic minim 1 dissolved in a tumbler of water, should be given between meals. Little or no liquid should be given during meals.

The bowels should be regulated by Mag. Sulph or Sodii Sulph. Tone should be given to the muscular wall of the stomach by galvanic electricity, also exercises recommended as following :—

1. Put the tips of the four fingers of your hand on the pit of the stomach, placing the fingers in a row

from above downwards. Give quick vibratory shakings up and down; about three or four shakings in a second—movements from 15 to 100.

2. Do the same exercise, putting the fingers in a row horizontal to the body. The shakings should be similar to the previous type, but they will be sideways. Number of movements 15 to 100.
3. Controlling the abdominal rectus should be practised—Exercise No. 10(a).
4. Lie on your back with the arms resting on the floor, lift your legs together as shown in Exercises Nos. 42 and 42(a). Try to do these exercises in quick succession. Number of movements 3 to 50.
5. Blow out, and contract the stomach as in Exercise No. 10, also do the Exercises Nos. 18, 19 and 20.
6. Exercises for improving the general muscularity of the body—Exercises Nos. 3, 4, 5, 44, 9, 14 and 15.

CANCER OF THE STOMACH

Causes.—This disease is not so common before the age of 35 or 40. It is practically a disease of the old men. It is equally common in the rich and the poor, and more common in males than in females.

Morbid Anatomy.—The pylorus is more commonly affected than any other part of the stomach. The disease extends to the other part of the organ especially along the lesser curvature. The wall of the stomach becomes uniformly infiltrated and thinned. The organ itself gets contracted to a small size. **Scirrhus Cancer** is the most common form that affects the stomach. From the pyloric end of the stomach the infiltration extends to the duodenum. The thickening affects the submucous layer as well as the muscular layers; later on the subserous layer is involved, and the adjacent peritoneal surface gets those cancerous deposits on them.

The ulcer progressing from the mucous layers to the muscular layers, may erode vessels, and cause hæmorrhage. Stenosis of the pylorus follows. The peritoneum may be involved, peritonitis may set in with perforation and death. Cancer involving the cardiac orifice of the stomach, causes obstruction of the oesophagus, due to extension of the infiltration to the oesophagus. Metastasis may occur to other organs and different parts of the body.

Symptoms.—In the beginning, the symptoms are those of gastritis. There is fullness, pain after ingestion of food, etc. Hydrochloric acid is often absent from the vomited matter. There is blood, or coffee ground vomiting. Gradually a tumour is felt in the part affected, which is revealed by X-ray examination. The tumour may grow smaller in course of time, or it may not be felt at all due to the destruction of its central parts, and the cancer spreading peripherally.

Surgical interference is necessary. Radium treatment is sometimes successful. Physical exercise is not advisable.

DUODENAL ULCER

Causes.—It is much more common in men than in women. It is similar in its nature of formation to that of gastric ulcer, but it is much less common than the occurrence of that disease. The ulcer affects the portion of the duodenum close to the pyloric orifice of the stomach.

Symptoms.—The symptoms are similar, but not generally so acute as that of gastric ulcer. Haematemesis and Melaena are present. Due to its chronic existence, adhesions are formed to the surrounding parts. Cicatrices cause obstruction in the pylorus. Consequently, dilatation of the stomach is manifested. Definite pain is experienced in the epigastrium, or near the right costal margin. There is pain which comes three or four hours after food. This is erroneously called "Hunger pain". The cause of the

pain is the passage of the acid chyme into the duodenum and over the ulcerated surface, during the later stage of gastric digestion. As soon as some food is introduced into the stomach, the passage of the acid fluid from the stomach is stopped, so the pain is temporarily relieved. The vomiting which occurs, does not relieve the pain. Haematemesis is not very frequent. Sometimes there is Melaena but no Haematemesis.

The appetite is not always bad. Sometimes perforation may take place, and the fluid may pass behind the colon into the right iliac fossa in front of the right kidney, and may form an abscess there ; or a subphrenic abscess may be formed.

A chronic duodenal ulcer could be recognised by X'ray after a Bismuth meal, as a round patch, the raised margin of which separating it partially from the lumen of the duodenum.

Treatment.— In the acute stage, the patient should be sent to bed, no physical strain or exercise allowed. Food should not be given per mouth. Rectal feeding should be adopted during the very acute condition. As the acid chyme poured from the stomach after the gastric digestion, irritates the ulcers situated in the duodenum, so complete stoppage of food per mouth, and rectal feeding for a few days following the acute stage would be the best treatment. To start feeding per mouth, milk should be given one ounce at a time, every two or three hours, with one-third quantity of lime water or Sodii Citras grain 10 added into it.

The gastric contents when poured into the duodenum, convert an enzyme called "pro-secretin" (secreted in the duodenum) into secretin, which being absorbed into the blood, selectively stimulates the pancreatic secretion. If the gastric acid chyme be allowed to be diluted by the addition of sufficient quantity of an alkali, such as lime water or Sodii Citras, the poured out contents from the stomach will not help the production of secretin. Consequently, the secretion of the pancreatic juice will be hampered. "Liquor pancreaticus" (Bengers) may be

added to the milk with great advantage, to help the pancreatic digestion.

Strict Diet in a case of Duodenal ulcer.—Early morning before getting up from the bed, the patient should wash the stomach down with half-an-ounce of Bismuth Oxy-carbonate in 8 ounces of water, and then lie down on his right side for half an hour till 6 a.m.

Then start taking his food every two hours, from 6 a.m. till 8 p. m.

Milk to be taken 8 ounces at a time thrice daily, and should be peptonised before it is taken.

Arrowroot 7 ounces with cream one ounce, should be taken twice daily.

Junkets 8 ounces twice daily.

Olive oil half ounce should be taken immediately before every meal of junkets or milk.

Tinct. Belladonna minim 5 should be taken before each meal of Arrowroot or Wheat Cream. The food should be taken warm or cold according to taste.

When the ulcer has healed up, some changes can be made in the diet.—Light tea with milk may be taken, with bread and butter or toast at breakfast time. At lunch time, chicken or fish may be taken with mashed potatoes and clear vegetable soup (without any sauce), also custard or junkets. At dinner time milk or milk pudding.

Medical Treatment.—During the acute stage when there is haemorrhage, the patient should be kept in bed, no food given per mouth for hours. Ice should be applied on the epigastrium. Tinct. Ferri Perchlor 5 minims in solution may be given every hour. If collapse is threatened, surgical interference is at once necessary.

Exercises.—So long as there is any sign of ulcer, physical exercise is forbidden. When all the acute symptoms have passed

off, and the patient is apparently cured, physical exercise may be attempted to improve the general physical condition.

Freehand Exercises.—Freehand exercises of the following types are recommended :—

Group I. Exercises Nos.—1, 2, 3, 4, 5, 44, 6, 8, and brisk-walk for about 3 months.

Group II. Exercise No.—15, in addition to Group I, for three months.

Group III. Exercises Nos.—17, 18 and 23 slowly in addition to Groups I and II for about three months.

Group IV. Exercises Nos.—19, 20 and 14, in addition to Groups I, II and III.

CHAPTER II

DISEASES OF THE INTESTINE

ENTERITIS

It is the inflammation of the Intestines.

Types of Enteritis.—Catarrhal Enteritis (acute).
Catarrhal Enteritis (chronic).

ACUTE CATARRHAL ENTERITIS

Anatomical Changes.—The morbid changes that take place in the mucous membrane of the Intestine, are similar to those that are found in the mucous membrane of the stomach in Gastritis. The tissues become more vascular and swollen. The Epithelial cells of the Leiberkuhn's glands become cloudy, swollen, and detached. In the inter-tubular tissues, cellular infiltration takes place. A large quantity of secretion (Intestinal juice) is discharged, the quality of the secretion is also changed enormously, causing disturbance of digestion. If not carefully treated, and cured early, the disease leads to chronic Enteritis.

Causes.—1. Predisposition is greatly responsible for the causation of acute Enteritis.

2. Fear of examinations.
3. Errors in Diet.
4. Atmospheric conditions.
5. Abuse of Purgatives.
6. Carelessness in Sanitary Technics.

1. **Predisposition.**—Voluminous quantity of food taken immediately after a very hard toil, or when the Intestines are already irritated due to slight indigestion.

2. **Fear of Examinations, Acute Domestic Anxieties, &c—**cause disturbance in the sympathetic nervous mechanism (Splanchnic nerves), resulting in acute vasomotor changes in the Intestines.

3. **Errors in Diet.**—Richly dressed and highly spiced food.

4. **Atmospheric Conditions.**—Acute Catarrhal Enteritis may be due to chill, but excessive heat may also be the cause. People of all ages, and especially children are susceptible to acute Enteritis during the hot weather. During very hot weather, milk, meat and practically all sorts of food stuff get quickly decomposed (this decomposition is due to the rapid growth of micro-organisms). Consumption of this decomposed food causes acute Enteritis.

5. **Abuse of Purgatives.**—Excessive use of purgatives often irritates the mucous membrane of the Intestines, causing an acute catarrh.

6. **Carelessness in Sanitary Technics.**—It favours the infection of microbes by contagion and want of cleanliness.

Symptoms.—The most important symptom is diarrhoea which is due to the alteration in the secretions poured into the intestinal canal, as well as to the increased peristalsis which may be due to the irritation of the mucous membrane of the intestinal wall by irritating substances formed by the abnormal fermentative processes, or due to the increased irritability of the mucous formed as a result of the inflammation.

The increased quantity of fluid is due to the increased exudation from the capillaries, or to diminished absorption through the villi. At first the excreta may be small in quantity, and solid, then semi-solid in consistency; but is quickly followed by an abundant quantity of liquid brownish in colour which soon becomes pale yellow, sometimes green, full of undigested food materials. Sometimes slimy mucous follows. The number of motions may be

3, 4 or even 10 in course of the day. The diarrhoea may start with vomiting. There is pain of continuous griping of a colicky character. The griping pain is followed by the passage of a motion. There is gurgling noise and tympanites due to formation of fermented gases inside the intestinal canal. The appetite is lost, there is thirst, and the tongue is slightly furred. There is depression of spirit and bodily weakness, due to the heavy loss of fluid from the system, when the diarrhoea is excessive.

Often, perfect rest and abstinence from food cure Enteritis quickly. The interval between the stools becomes longer, the quantity excreted becomes less and less, the consistency becomes thicker, and finally ends in constipation for a day or two.

Treatment.—The patient should rest in bed, and the body should be kept warm. No food should be given till the stool gets little thicker, and the interval between the motions becomes longer. Thin barley water or arrowroot may be given, to start with. Then milk and lime water, and later on, mutton broth with toast in small quantity at a time; finally on the sixth or the seventh day, ordinary diet may be prescribed. Several cases have resorted to medicine. But in ordinary Catarrhal Enteritis, no medicine of an astringent character should be given until the mass of undigested food material has passed out. Sometimes a dose of Castor Oil may be administered with success. The undigested and irritating food materials pass out, and prevent further irritation. But if very thin fluid motion continues, and the patient feels gradually very weak, astringents in the form of Tinct. Opii 5 minims every 4 hours, Sulphuric Acid Dil, or Bismuth Salicylas is useful.

No physical exercise is recommended during an attack of acute Catarrhal Enteritis. Rest is the best treatment.

CHRONIC ENTERITIS

Chronic Catarrhal Enteritis originates as the sequela of an acute attack,

Anatomical Changes.—The quantity and quality of the intestinal juice are changed. There is chronic inflammation of the mucous membrane of the intestines. Naturally there is disturbance of circulation and nutrition of the parts affected, so the amount of nutrition that could be expected from the food materials ingested, is very much lowered. Consequently, the general nutrition is lowered by a very great degree.

Causes.—Similar to those that are found in acute Enteritis. Moreover abuse of purgatives and the disturbances in the Portal circulation due to the Liver, Lung and Heart troubles, aggravate the situation.

Symptoms.—1. Diarrhoea is present in a chronic form. It sometimes alternates with constipation which is due to the weakness of the muscular structure, as a result of the disturbance of circulation, and the nutrition of the walls of the intestines.

2. Chronic Tympanites.
3. Tenderness in the Hypogastrium and in the Iliac regions.
4. The faeces contain mostly undigested food material and a large quantity of mucous.

If the lesion be in the small intestine, the evacuations are copious and slimy, but not very frequent. If it be in the large intestine, small loose motions are passed in course of short intervals. If in the rectum the motions are frequent, and there is tenesmus present during and after the motion.

Treatment.—

1. **Medicinal.**—In some cases antiseptics and astringents may be used. If the lesion is situated in the colon, lavage with 2 or 3 pints of warm water with Boric acid ($\frac{1}{2}$ dram to a pint) is of much value,

Injection of Emetine Hydrochlor.—A preliminary dose—half a grain, the second dose 1 grain, and a grain in each subsequent dose upto 4 grains in the total, given at an interval of three days, give marvellous results. In chronic Enteritis it helps the cure by causing profuse flow of the natural bile which itself is a good antiseptic and purgative.

2. Regulation of Diet.—Easily digestible and nutritious diet should be adopted.

Exercise.—Exercises taken to improve the Portal circulation, will help the secretion of the natural bile, also improve the nutrition of the mucous membrane and the glands of the intestines.

Group I. Exercises :—

- (a) Rub the Hepatic region with the fingers moving in a circular way, as well as up and down for about 5 minutes.
- (b) Strike the same region quickly with the tips of the four fingers of the hand, just as one plays on the Piano, for about 5 minutes.
- (c) Exercises Nos. 9 and 10.

Group II. To remove the product of inflammation from the mucous membrane, and stimulate the glands of the intestines :—

- (a) Exercises Nos.—10(a), 17, 18, 19, 20.
- (b) Strike round the umbilicus with the tips of the four fingers of the hand moving in a circular way, making 10 to 15 circles from right to left, and then from left to right for the same number of times.

Group III. To stimulate the Intestinal walls and encourage normal peristalsis :—

- (a) Exercises Nos.—25, 32, 26, 9, 27, 42, 42(a).
- (b) Strike round the abdomen with the tips of the four fingers of the hand, starting from the right inguinal region, along the course of the large Intestine up to the Hepatic region, then transversely towards

the Hypochondriac region; and then down again along the left lumbar to the left inguinal region and then stop. Make these circular movements alternately with a reverse process (left inguinal region to the right inguinal) 10 to 20 times.

In Chronic Enteritis and Chronic Dysentery cases, stretching exercises, especially of the abdominal muscles, sometimes cause aggravation of symptoms. So exercises that conduce to general physical improvement, and indirect stimulation of the vegetative nervous system should be encouraged. In these cases—Exs. Nos. 14 & 15 with the other breathing exercises should be attempted first, and after 3 or 4 months, the stretching movements, such as Exs. Nos. 9, 19, 19(a), 20, etc., may be attempted.

Subjects who are very much emaciated and cannot perform Ex. No. 14 should go in for Exs. Nos.—1, 2, 3, 4, 5, 8, & 15 for about 6 weeks (along with massage), as advised under Groups I, II & III already described. Then add Ex. No. 14 to the chart and carry on for about 6 weeks or so, and then the stretching movements may be attempted.

CONSTIPATION

By constipation is meant the retention of faeces in the Intestines for more than 24 hours.

The average time for the food stuff to reach the different parts of the Intestinal Canal is as mentioned below :—

The beginning of the large Intestine	.	4½ to 5 hours.
Hepatic flexor of the large Intestine	.	6½ „ 7 „
Spleenic flexor of the large Intestine	.	9 „ 10 „
Leaving Spleenic flexor	.	11 „ 12 „
Pelvic portion of the Intestine	.	12 „ 14 „
Rectum	.	20 „ 24 „

The natural desire for defecation is produced by the entry of the faecal matter into the Rectum in a mass. This entry

is caused as the result of a reflex stimulation caused by sudden getting up from the bed, drinking of cold or hot water, or taking some food in the early morning. Even the habitual desire of defecating during the early morning, or at a certain fixed hour in the day or night causes the said reflex stimulation.

Types of Constipation.—(a) Occasional.

(b) Habitual.

Occasional Constipation.—It is due to some accidental causes for which the functions of the alimentary canal are not responsible.

Causes.—1. Weakness of the abdominal muscles.

2. Temporary insufficient abdominal pressure on the muscles, due to sprain in those abdominal muscles.

3. Diet taken by the patient being very easily digestible, practically leaves too small a quantity of residue to be got rid of as faeces, or the diet may be too dry to shift easily, or the mass of the food being too deficient in cellulose of vegetable substances which would naturally stimulate the intestinal mucous membrane and cause peristalsis.

4. Drinking a very small quantity of water, as prescribed for an obese person under a special treatment.

5. Elimination of too large quantity of water from the system through urine, as in the case of Diabetic patients where a very small quantity of fluid is left with the faeces in the Intestines.

Symptoms.—In a man, usually there occurs two or at least one evacuation of the bowels in course of 24 hours. Sometimes, cases are met with, in which the evacuation takes place every other day. These people may not complain of any trouble, but if the

bowels do not work for 3 or 4 days, the rectum becomes loaded with hard round masses of faecal matter. During this period of retention the patient may complain of various troubles, such as fullness in the abdomen, nausea, even vomiting, loss of appetite, headache, languor, sleeplessness and so on.

Treatment.—A moderate dose of purgative will give temporary relief. But the patient should be careful as not to suffer from this trouble in the future. He should change his diet which should contain plenty of potatoes, milk and fresh fruits. The following foods help to increase the peristaltic action of the intestines :—

Agar-agar in fruit geletin	Ripe olives
Honey	Nuts
Bran and bran preparations	Whole meal bread
Vegetable salad (raw)	Olive oil
Figs	Butter milk
Prunes	Butter.

Sufficient quantity of water should be drunk with the meals.

Exercises.—

Group I. For general constitution.—

Exercises Nos.—3, 14, 15 and running if the heart condition permits.

Group II. For the Abdomen specially.—

Exercises Nos.—9, 10, 10(a), 26, 27, 42 and 42(a).

Habitual Constipation.—

Causes.—1. Sedentary Habit.

2. Diseases of the stomach, causing regular vomiting which prevents the passing of much fluid from the stomach down into the Intestines.
3. Stenosis of the Pyloric end of the stomach, or dilatation of the stomach.

4. Chronic Intestinal Catarrh.
5. Degeneration or relaxation of the Intestinal muscles after some severe infectious disease.
6. Chronic Appendicitis.
7. Pelvic inflammation causing impairment of nutrition of the Intestinal muscles, or the inflammation causing adhesions which eventually stand in the way of the movement of the bowels.
8. Contraction of the Sphincter Ani muscle.
9. Weakness of the abdominal expiratory muscles such as the Diaphragm, the Levator Ani muscle and other muscles of the pelvic floor which cause compression on the abdominal contents. On account of weakness, these muscles fail to help regularly the passage of faeces from the colon into the rectum, and from the rectum through the anal passage.
10. Weakness due to old age or anaemia.
11. Nervous atonicity, *e.g.*, Hysteria, Neurasthenia, Melancholia, etc.
12. Diseases of the brain and the spinal cord, *e.g.*, Tumour, Haemorrhage, etc.
13. Habits, *e.g.*, hurrying into business, false modesty in a large household or in girls' school, insufficient supply of lavatory accommodation in some large establishments.
14. Sometimes mere laziness may give rise to Habitual Constipation.

Symptoms.—If due to habit, inconvenience or some internal troubles, the bowels are left only to act at intervals of 3, 5 or more days, the rectum becomes loaded with hard faecal masses. The evacuations are very sluggish, there is a feeling of weight and tension

in the abdomen. There is usually a sort of tenderness felt along the course of the colon due to the stretching of the bowel with the loaded faeces. There are constant headache and several other nervous troubles, especially disturbed sleep, restlessness, vague pains in the back and in the limbs, often neuralgic pains in some parts of the body, nocturnal emissions, sexual irritability, and sometimes debility or mental depression.

The scybalae may pass out once after a few days of retention, and the same may be repeated two or three times within a few hours, till the lower bowel is emptied. The bowels may remain inactive for another period of several days. During this period of retention, various sorts of troubles may be experienced by the patient.

Treatment.—The treatment of Habitual Constipation should be as far as possible, to find out the cause, and remove it. Daily visit to the closet in the early morning is a very good habit, and this should be preceded by an intake of a tumblerful of cold water in the summer and tepid water in the cold weather ; as this will induce peristalsis of the Intestines reflexly.

Plenty of vegetables should be taken. Meat should be avoided as much as possible as this will cause constipation. Brown bread, Oatmeal porridge, Peas or lentils soaked in water over night, should be taken in the breakfast time, with sufficient quantity of fresh fruits.

The food should contain sufficient quantity of water, *i.e.*, it should not be dry. During meals plenty of water should be drunk.

The following is a meatless, as well as suitable daily menu for a patient suffering from habitual constipation.

Breakfast.—

Entire—wheat bread (dry toasted)	. 3 or 4 slices
Vegetable butter . . . . .	. ½ ounce
Figs, soaked in water . . . . .	. 8 to 10
Ripe olives . . . . .	. ½ cupful
Walnuts .. . . .	. 4 to 5

Apple	1 or 2
Any other fresh fruit available	According to taste and requirement.

Lunch.—

Entire—wheat bread	2 slices
Potato (with skin) baked	3 to 4 ounces
Vegetable salad (large raw) made of raw tomatoes, cabbage, lettuce, celery, water-cress, spinach, carrot or grated turnip	sufficient quantity
Ripe olives	$\frac{1}{2}$ cupful
Cottage cheese	1 ounce
Honey	2 to 4 drams.

Dinner.—

Entire wheat bread with vegetable butter	3 slices
Dry figs, soaked in water	4 to 5
Dates	6 to 10
Potato boiled	4 ounces
Vegetable salad	according to re- quirement
Honey	$\frac{1}{4}$ ounce.

Sedentary habits should be got rid of. Sufficient exercises with special abdominal movements should be practised. Abdominal massage is very useful.

Exercises recommended :—

Group I. For general constitution.—

Exercises Nos.—9, 14 and 15.

Group II. For the Abdomen specially—

Exercises Nos.—10, 10(a), 9, 17, 18, 19, 19(a),

23, 26, 27, 42, 42(a), 29,

APPENDICITIS

It is a catarrhal inflammation of the vermiform appendix. The inflammation may lead to ulceration, localised peritonitis, or even perforation.

Causes.—It is a disease common amongst the younger people, and is met with more frequently in the males than in the females. Indigestion is often the immediate cause, or occasionally cold or injury to the appendix, faecal accumulations, foreign bodies, *e.g.*, stones of fruits, etc., lodged in the caecum. Acute Intestinal catarrh may often cause Appendicitis.

Morbid Anatomy.—Due to indigestion, there is stagnation of the intestinal contents in the caecum, this irritates the mucous membrane, and causes disturbance of circulation in the mucous membrane of the appendix. The important micro-organisms present in the intestines, especially the *Bacillus Coli Communis* cannot exert any normal influence upon the tissues. As a consequence there sets in an inflammation, first in the mucous membrane of the lumen of the appendix; and then the inflammation spreads to the surrounding tissues.

Sometimes torsion of the body of the appendix may cause Appendicitis. Other pyogenic organisms, *e.g.*, Tubercle or Typhoid bacilli may produce Appendicitis.

Symptoms.—The onset is sudden, after a short period of indigestion or constipation. The patient is taken with a severe pain in the Abdomen especially in the right Iliac region, with lowering of the general condition. There is vomiting, also rise of temperature. The tongue is furred, the appetite is lost. Great thirst and marked constipation are also present. There is a point most tender (Mc. Burney's Point) which is situated at the centre of an imaginary line drawn from the anterior, superior spine of the Ilium to the Umbilicus. The patient lies with his right thigh adducted (*i.e.*, drawn in, towards the Abdomen). He

feels much pain if his right leg is pulled to straighten it. The tenderness is generally fixed, and is nearly always at the "Mc. Burney's point", but it may radiate to the umbilical region or to the left inguinal region. Certain amount of hardness can be felt round this point on pressure. This hardness may be due partly to the accumulated faecal matter and partly to the inflammatory thickenings in the intestinal walls. The symptoms may last for a few days. Under proper medical treatment and rest, they may subside. But almost always the trouble recurs unless the diseased Appendix is operated upon.

In some cases, rest and ordinary medical treatment are of no avail. The general symptoms do not subside in the course of 3 or 4 days, the swelling increases, and a local abscess is formed. In other cases, the symptoms may become severe, and general peritonitis threatens. In such conditions, perforation may occur.

Treatment.—During the acute stage, rest in bed and hot fomentations on the painful part are essential. Antiphlogistine may be applied to the region of the Appendix, and hot fomentations on the top of the application are of much value. As soon as the diagnosis is confirmed, and the acute stage is over with medical treatment, steps should be taken so that the symptoms may not recur. In several cases, treatment by physical exercise will prevent future recurrence of the symptoms.

In cases where the symptoms recur, operation such as—removal of the appendix during the quiescent stage, has been advocated by several physicians, and has been done with much benefit to the patient.

During the acute stage, no physical exercise should be attempted. But during the quiescent period, or after the removal of the appendix, regular physical exercise should be taken.

To improve the peristaltic movements of the intestines, and to prevent accumulation of faecal concretions lodged in the caecum for a long time, also to get rid of the inflammatory products in the

mucous membrane and the walls of the appendix, the following exercises may be attempted :—

Group I. Exercises Nos.—1, 3, 4, 5, 8, 21 and 15 (with moderation) should be practised for three weeks, and then—

Group II. Exercises Nos.—9, 20, 21, 22, 23, 24, 26, 42, 42(a) and 43, plus Group I should be practised.

Along with the exercises as mentioned above (Groups I & II), Massage—very careful and mild—of the right iliac fossa may be attempted. At first vibrations, then gradually massage with light pressure, may be given regularly. Striking the back of the waist with the palm of the hand near the region of the sacral plexus should be continued along with the vibrations.

To remove the thickenings and adhesions produced as a result of the inflammation, the following exercises should be carried on for a longer period :—

Group III. Abdominal exercises.—Exercises Nos. 10, 10(a), 17, 18, 19, 19(a), 20, 23, 24, 26, 27, 42, 42(a).

Group IV. For general physical improvement.—Exercises Nos. 1, 2, 3, 4, 5, 9, 14, 15.

HAEMORRHOIDS (Piles).

Piles are a varicose condition of the rectal veins.

Piles exist in two forms.—1. Internal Piles.

2. External Piles

Causes.—1. Portal obstruction.

2. Habitual Constipation especially in women.

3. Sedentary occupations and want of sufficient physical exercise.

4. Alcoholic habit, as the excess of sugar in alcohol, causes Portal congestion which gives rise to Piles.

INTERNAL PILES

These are swellings which may in some cases exist altogether inside, or may be partly outside the anus. In the latter case they are seen when the patient bears "down". Piles are limited to the lower 8 inches of the rectum. There may be general varicosity of the veins in the sub-mucous tissue, where they are entirely internal. In these cases there is not much haemorrhage. In some cases distinct haemorrhoidal masses are formed. These formations are of two types, one is longitudinal or fleshy, the other is globular or bleeding.

Symptoms.—There is usually a sense of weight or fullness about the anus, with slight pain (which is not often experienced) increased before and after defecation. After some time there is haemorrhage, and occasionally the inflamed mass may protrude, when intense pain is experienced due to the grip of the sphincter around the protruded mass. At first the haemorrhage is negligible, but later on, it may be profuse; and the patient may suffer from anaemia as a result. The protruded mass may sometimes cause strangulation. When reposition is not effected, the mass becomes inflamed and may run on to ulceration or even sloughing.

Local Treatment.—Massage of the anus is very effective. It will break up inflammatory products and infiltrations round the varicose veins.

EXTERNAL PILES

Symptoms.—External Piles consist of small central veins in a varicose condition, surrounded by the formation of sub-cutaneous fibrocellular tissue. They are found at the margin of the anus, and as a matter of fact, lie imbedded in the folds of the skin. In the normal condition, they look like relaxed longitudinal folds of skin, and give rise to no marked symptoms, except slight pruritus or a sense of fullness just before and after the passing of stool. External Piles often get inflamed from cold or local irritation; and then they will appear like bluish rounded swellings, very

painful and tender, making the patient very much uncomfortable when sitting or walking.

Treatment.—Palliative.—The parts should be carefully protected from injury and cold. After defecation, the use of paper should be avoided, cotton wool should be used instead, sponged with cold water afterwards, and the protruded mass should be pushed back.

General Treatment of Piles.—

1. People addicted to alcohol should avoid it religiously.
2. The piles should be kept scrupulously clean.
3. The bowels should be kept regularly open and loose. The functions of the Liver should be encouraged by the administration of mineral waters or sulphur in some form.
4. Injection of Emeline is of much value.
5. The diet should be regulated. Plenty of fresh fruits should be taken.
6. Much attention should be paid to physical exercise, which will help the digestion, keep the liver in order, and thereby relieve the Portal congestion, as well improve the general physical condition.
7. Local Exercise and Massage of the Anus.—First of all the protruded mass should be carefully pushed back by a masseur with a little Hamamelis Ointment on the finger. Then the patient should lie on his back, with the pelvis slightly raised over a thin pillow placed under it. Now he should try to contract and relax alternately his sphincter ani muscle voluntarily for a number of times, starting from 5 to 50 or even upto 100 times. Then he should remain in that relaxed position for about 3 minutes. Now the masseur should very carefully introduce his forefinger anointed with sterilized vaseline, and start massaging the anus slowly for two or three minutes.

Anal Massage.—The masseur should introduce his finger first into the anus pressing on the fleshy pile, and push the finger proceeding in a snail-like way upwards for about 2 inches. Then gently bring down the finger almost to the mouth of the anus, and roll the tip of the finger, circularly towards the right to a certain extent, and press upon another mass. He should then proceed upwards similarly as in the first attempt, and thus complete the movement in a circle round the anal orifice. He should introduce his finger again, and give a few circular pressings round the anus, finish the massage, and then slowly and carefully remove the finger away.

Now the patient should lie in the original position for 5 minutes, then turn on his right for about 3 minutes, and on his left for the same period, and finally gets up.

To improve the general physical condition and the Portal circulation, the following exercises should be practised.

Exercises Nos.—3, 4, 5, 9, 14, 15, 17, 18, 19, 19(a), and especially —10 and 10(a).

CHAPTER III

DISEASES OF THE RESPIRATORY PASSAGES

ACUTE RHINITIS

It may be caused by irritation of any kind, as the dust, the vapour of some trade, or some injury. It may be due to cold or catarrh.

Symptoms.—There is profuse sneezing attended with mucopurulent discharge through the nose, there is lachrymation with frontal headache and slight rise of temperature. There is catarrhal inflammation of the mucous membrane of the nose, and usually of the conjunctivae, frontal sinus, pharynx, and the eustachian tubes. The inflammation may spread to the larynx, trachea and the bronchi. When the catarrh extends to the larynx, the voice gets hoarse, and there is constant irritating cough, and its further extension to the lungs causes bronchitis.

The acute state may subside in 2 or 3 days. When the discharge again appears, it becomes thicker and more opaque and finally mucopurulent. This condition lasts for 3 or 4 days. It may last for 2 or 3 weeks.

Treatment.—Rest is essential. At night a full dose of Dover's powder may be given internally. Local application of a spray consisting of camphor and menthol grain 8 each dissolved in one ounce of paroline, or frequent inhalations of oil Eucalyptus, and internal administration of 5 to 10 minims of oil Eucalyptus with a little sugar taken four times daily, may cure the disorder.

Diet.—Milk, milk and sodawater, or milk and sago should be taken.

At the onset of the trouble 2 or 3 grains of Calomel at bed-time followed by a dose of Mag. Sulph next morning will much relieve the acute symptoms.

As soon as the acuteness of the trouble has passed off, the following exercises should be attempted preferably in early morning :—

- Exercise.**—1. Exercise No. 39—position will be sitting on a chair. Number of movements 10 to as many as could be done without feeling tired.
2. Exercise No. 35—position same—sitting. Number of movements should be half of that mentioned in Ex. No. 39.
3. Exercise No. 5—position—sitting on a chair. The number of movements should be three-fourth of Ex. No. 39.

The place for exercise should be a well-ventilated room, but care should be taken to avoid draught.

Gradually when the trouble is got rid of, steps should be taken to improve the general constitution, and for which the set of Exercises Nos. 3, 4, 5, 9, 13, 14 and 15 should be attempted regularly.

EPISTAXIS

(Bleeding from the Nose)

Causes.—There are two different types of causes that are responsible for this disorder.

1. Local.
2. Constitutional.

Local.—Attended with marked congestion of the nasal mucous membrane, *e.g.*, (a) acute Catarrhal, where the Catarrhal (watery or mucoid) discharge is always mixed up with blood ; (b) Tubercular or Syphilitic growths, where the bleeding is usually of a recurrent type, the blood is small in quantity, it is swallowed or coughed up, and may be mistaken for Haemoptysis ; (c) Traumatic lesion such as a blow, a punch on the nose where the hæmorrhage may be slightly profuse, but can be checked quickly by proper treatment. Young boxers, who, as a matter of fact, are novices in the art, get

bleeding from the nose on one or two occasions even with a light punch, because the mucous membrane of their nose is comparatively delicate. But after they get those punches for a few days more, the underlying mucous membrane of their nose gets more and more tough and it does not bleed so easily.

Constitutional.—The bleeding though usually slight, may sometimes be so profuse as to endanger life. It comes often from the anterior part of the nasal septum. There is an idiopathic tendency to bleed through the nose with a slight provocation, with or without, a wound. Epistaxis is often due to fatty degeneration of the vessels due to anaemia, etc. It is due to arterio-sclerosis in many elderly people. High blood-pressure due to some constitutional cause is responsible for Epistaxis in several middle-aged people. Epistaxis is also a complication in some acute fevers, *e.g.*, Typhoid, Scarlet Fever, etc. It is more frequent in boys than girls.

Treatment.—First try to check the haemorrhage if it is profuse, and then try to find out the constitutional cause. In case of Bright's Disease, or Cardiac and Pulmonary Diseases, there is no need of checking the bleeding, unless it is very profuse; as it is a natural process to relieve the congestion. Watch the tension in the artery so long it is high; there is no harm if the haemorrhage is slight or even profuse.

To stop the haemorrhage, temporarily keep the patient in a sitting posture, raising the arms above the head, apply an ice-bag to the back of the neck. If this is not sufficient, soak a little cotton wool with a solution of Adrenalin Chloride (1 in 5,000) and plug the nares with it. If this fails, in ordinary Traumatic cases such as due to a punch during boxing, keep the patient in a sitting posture, apply nasal douche with ice-cold water, or tell him to sniff in the same water if a nasal douche is not at hand, and apply some cotton wool soaked in ice-cold water externally; if this done, the haemorrhage will stop in a very short time. The bleeding may be stopped mechanically, if patient is allowed to lie on his back prone (*i.e.*, with the head and the trunk well raised), and the arms placed in yard position, also

pushed well back, so that the chest is expanded to its utmost ; but at the same time care should be taken to see that the respiration is not hampered. By this process, an increase of negative pressure is produced in the Thorax, the venous flow is improved, the pressure is lessened, and the bleeding is stopped.

ADENOIDS

The disease commonly known as Adenoids, is the Hypertrophy of the Pharyngeal tonsils. But as the adenoid hyperplasia and vegetations involve both the pharynx and the naso-respiratory passages, it has been dealt with in this book under the Diseases of the Respiratory passages. If neglected, this affection may spread through the Eustachian tubes and cause inflammation of the middle ear. When developed, this disease gives many external manifestations. The face is lengthened, the upper lip becomes retracted and short, the mouth is kept open and there is habitual mouth-breathing which is worse at night. The alae nasae are collapsed, a general dull and vacant expression is acquired, and there is liability of Catarrhal Rhinitis with occasional bloody nasal secretion. The child cannot pronounce the consonants M and N in articulation. He stammers, and in some cases the child may suffer from epilepsy.

This disease has become quite common among the children of the metropolis, where they live in close and vitiated atmosphere, do not undergo sufficient fresh-air exercise in the open. Adulterated, insufficient and non-nutritious diets may be counted as responsible factors impeding the general nutrition.

The common proverb "The face is the index of the mind" is quite applicable in these Adenoid cases. In almost all cases, we find these Adenoid patients with vacant looks ; they do not show much signs of intelligence in them. The parents of these unfortunate children, take them as naturally unintelligent specimens, and do not care much to find out the real cause of the trouble. As a matter of fact, numbers of these Adenoid cases are neglected wilfully. Unless and until these patients show signs of chronic

trouble in the throat or the inflammation of the Eustachian tube or the middle ear, no notice is taken about this trouble in them. They are not taken to a physician by whom the diagnosis could have been made long time ago. Usually the doctor treats him for the inflammation of the throat or the ear with antiseptic lotions and tonics, and sometimes he advises the patients to undergo an operation (Removal of the Lymphoid follicles by scraping, etc.). But in a great majority of these operated cases, the trouble comes back again, as it is not a local disease, but a constitutional one. It requires an intensive constitutional treatment.

Treatment.—If properly and carefully treated before puberty, the child improves both physically and mentally.

The catarrhal condition of the throat and the eustachian tube or the nasal passages should be carefully treated with gargles of Listerin solution or other suitable antiseptics. Tonics should be administered. Easily digestible and nutritious diets should be given. Sufficient out-door exercises and especially breathing exercises are recommended.

In many of these Adenoid cases, there develops Bronchial Asthma. In these cases the medical treatment of chronic Asthma as a routine procedure is of no avail, unless the pathological condition of the nose and throat, and the general outlook of the patient are carefully scrutinised, and treated accordingly. Treatment of Adenoids by my system of breathing exercises with other medico-hygienic steps has been quite a success.

Exercises recommended.—

For improvement of the general constitution.—

Exercises Nos. 3, 4, 9, 14, 18, 17, 19, 19(a), 27 and 15.

For the local trouble.—

Exercises Nos. 1, 2, 5, 38, 39, 44 and 8.

Out-door sports and games should always be encouraged.

LARYNGITIS

1. Acute Laryngitis.
2. Chronic Laryngitis.

Acute Laryngitis.—It is not a very serious trouble. It comes on very suddenly, and lasts for a week or so.

Causes.—It is usually due to exposure to cold air. It may also be caused by the inhalation of irritating vapours, dirty and dusty due to the presence of foreign bodies in them, the inflammation spreading from the naso-pharynx or the bronchi. Some specific fevers may also cause it.

Symptoms.—The first experience is soreness or dryness of the throat, the voice becomes hoarse or it may be entirely lost. There is cough with the expectoration of small plugs of mucus. In the adults the respiration is very seldom affected, but in young children dyspnoea is very often a marked symptom. Seldom there is any fever at all.

Treatment.—The bowels should be kept well regulated.

Diet.—Light, nutritious and mostly fluid.

The use of voice must be stopped. The patient should be kept in a moist and warm atmosphere. Inhalations in the form of a spray consisting of a few drops of Tincture Benzoin Compound, Oil Terebin and Oil Eucalyptus in some hot water will do a lot of good. External applications of hot fomentations on the box of the larynx (front of the throat), gives much relief.

Chronic Laryngitis.—In this the symptom—hoarseness of the voice—remains persistent for some time, and there is every chance of occasional acute attacks.

Causes.—Rheumatic and gouty people have a pre-disposition to Chronic Laryngitis. Habit of speaking loudly, such as teaching, singing, the business of actors or clergymen, etc. Tubercular or Syphilitic growths in the larynx, also nasal obstruction due to some pathological growths.

Treatment.—The principle of treatment in chronic laryngitis is removal of the cause. People in whom the chief cause of the disease is excessive speaking, should be very conservative in talking or singing. Pathological obstructions of the nasal passages should be surgically removed. Weak solution of silver nitrate should be applied locally. Inhalations of menthol, turpentine, etc., should have resorted to for 15 minutes 3 times daily. Other constitutional causes, *e.g.*, Tubercle, Syphilis, etc., should be dealt with accordingly. Bowels should be kept regular.

Diet.—Light and nutritious. Alcohol should be strictly avoided.

Exercises.—The mouth should be kept closed, and breathing exercises should be attempted in a dry and well-ventilated place which is also free from dust and dirt.

Exercises recommended.—

Exercises Nos.—39, 2, 38, (Breathing).

Exercises Nos.—5, 9, 14, 17, 18, 15 (Constitutional.)

DISEASES OF THE BRONCHI

The diseases of the Bronchi may be classified as Acute, Chronic and Paroxysmal.

ACUTE BRONCHITIS

It is an inflammation of the Bronchial tubes. It is very common in cold countries.

Causes.—1. Sudden exposure to cold.

2. It may also be caused by the extension of the inflammation from Laryngitis.
3. Certain occupations which expose people to irritating vapours of chemicals, or dusts.
4. As a complication of several specific fevers, *e.g.*, Measles, Whooping Cough, Typhoid, Diphtheria, Influenza, etc., and it often complicates Bright's Disease.

5. Age is a very important factor in the causation of the disease. Infants, young children and elderly people are very much susceptible to Acute Bronchitis.
6. People having luxurious habits, also those having their vitality lowered through insufficient food, living in insanitary conditions and having exhausting occupations, are liable to contract this disease very easily.

Symptoms.—There is often a sign of tightness in the chest, and soreness behind the Sternum, shortness of breath and frequent cough. In mild cases there is only a very slight malaise and cough with discharge of mucus, but in severe cases there is slight fever. The temperature rising up to 100° or 102° . There is loss of appetite, furred tongue and constipation. The Sputum is viscid and is scanty with occasional streaks of blood during the first few days. It then becomes thinner, and can be more easily coughed out.

Treatment.—The patient should take rest in either case, mild or severe. In severe cases, the patient should at once take to bed in a warm room kept constantly moist by the steam issuing from a Bronchitis-kettle. During the first stage, the secretion of mucus from the mucous membrane of the Bronchial tubes should be promoted by Pot. Citras, Liq. Am. Acetatis, and Vinum Ipecacuanha. When the secretion is free, give little stimulant expectorants. If the patient has got a rheumatic diathesis, or the sputum becomes very tenacious, add Pot-Iodide—a very small dose say $2\frac{1}{2}$ grains in each dose of the mixture. During the stage of recovery, prescribe tonics and Cod Liver Oil. Sudden exposure to cold should be avoided.

Diet.—Light and nutritious, preferably fluid diet should be given.

Exercise.—During the convalescent stage, the patient should be advised the following exercises,—Exercises Nos.—39, 35, 33, 34, 34(a), 32, 32(a), 32(b), 36. Later on, when he gains strength Nos.—9, 17, 18, 14 and 15.

CHRONIC BRONCHITIS.

It is a chronic inflammation of the Bronchial tubes.

Causes.—Chronic Bronchitis may occur in any age. But it is more common in old people and plethoric subjects, specially those who have gouty diathesis. It is also a prominent complication of Bright's Disease and Phthisis, a frequent sequela of Mitral Regurgitation and of acute specific fevers, specially Measles and Enteric fever.

Symptoms.—The common consequence of Chronic Bronchitis is a dilated right heart, and the subject gets a peculiar appearance, a short thick neck, flushed face, always short of breath with wheezy respiration and pulsating jugular veins. The history is a long-standing one with occasional aggravations specially in winter. A generalised Emphysema results. Except when it is a complication of Phthisis, it is non-febrile as a rule.

Treatment.—1.—The bowels should be moved regularly, and the general condition improved.

2. The nutrition of the Lung tissue should be carefully attended to.

Exercise.—The following exercises recommended for improving the nutrition and vitality of the Lungs.—

Exercises Nos.—1, 33, 34, 34(*d*), 35, 39, 36, 5 and 44.

To keep the bowels regular, and improve the general constitution, the following exercises should be attempted.—

Exercise Nos.—8, 9, 10, 10(*a*), 17, 18, 21, 23, 27, 32, 32(*a*), 32(*b*).

When all these exercises have become very free, and the patient has improved much in his respiratory condition, he may attempt :—

Exercises Nos.—14, 15. But the number of movements should never exceed fifty with each figure.

ASTHMA.

Sudden paroxysmal attack of dyspnoea is a chief characteristic of Asthma. The attack subsides after a time, and recurs at irregular intervals.

Symptoms.—This trouble often commences in the early morning hours between 2 a.m. and 4 a.m. The patient usually awakens with a feeling of tightness in the chest, though the patient may have gone to bed apparently without any trouble. He gasps for breath, gets out, and opens the window to allow more fresh air to get in. He clings to surrounding objects, so as to fix the accessory muscles of respiration. The chest is nearly fixed in a condition of inspiration with very short inspiratory efforts. There is an extraordinary long expiration, accompanied by a loud wheezing. The chest is over-resonant on percussion. On auscultation the short inspiratory effort is heard very feeble, and is scarcely audible. The normal vesicular murmur is replaced by loud rhonchi. There may be heard some coarse rales due to the Bronchitis, which is a concomitant factor. There is no fever. The face gets cyanosed, the eyes are prominent, and the conjunctivæ red. But after about 2 or 3 hours the patient coughs and expectorates some thin transparent mucus which may be tinged with blood. After some expectorations, the patient begins to feel somewhat relieved, he breathes more easily, the cyanosis is less marked, the whole trouble is practically over, and he falls asleep.

Each attack of Asthma may last from a few hours to a few days, and then the patient suddenly recovers his normal condition; the recurrences at longer or shorter intervals depend much upon the exciting causes. A patient may remain free from the attack for a long time, if he cares to avoid what usually brings on the attack. Several of the Asthma patients who acquire the trouble in their childhood recover in adult age. But those who acquire it in middle age, very seldom recover. Emphysema usually develops in long-standing cases,

Causes.—Asthma is due to spasm of the involuntary bronchial muscles. The sub-mucous and the mucous membranes which form the inner lining of the bronchial tubes become hyperaemic. Some medical authorities believe that an Asthma diathesis, also a congenital and often inherited constitutional abnormality are the essential factors in the causation of the disease. They also believe that, it is caused by a slight deviation from the average blood chemistry which results in the Vagal Constituent of the Bronchial Nervous System becoming the predominant factor. In such cases, certain reflex chemical and mental stimuli which have no effect on normal individuals, give rise to the spasm of the bronchial muscles and excessive secretion of the bronchial mucous glands, causing congestion in the Bronchi.

- Dr. J. Andre suggests that Asthma is caused by toxæmia of all kinds, autogenous or exogenous, elementary or infective, protein or mineral.

Asthma may occur at any age. But in most cases it makes its first appearance soon after puberty. A neurotic family history is often observed in the causation of Asthma. It is sometimes associated with Neuralgia, Migraine, Faints and the like in the same person. Any previous Lung disease, Chronic Bronchitis, Malaria, Gout and Syphilis have been held responsible for some cases. Sometimes it occurs after the subsidence of some skin eruptions such as Eczema, etc. It is more frequently found in males than in females.

Among the exciting causes—particular climate or atmosphere determines the attack. One patient who is free from Asthma at the sea level, may at once get an attack as soon as he seeks a high altitude. In some cases the patient gets relief as soon as he reaches that height.

Treatment.—During an Asthmatic fit, inhalation of Amyl Nitrite or Vapour from a teaspoonful of turpentine and chloroform in equal parts, is of much value. Other preparations in the form of Stramonium, Belladonna or Pot. Nitrates cigarettes are sometimes used with much benefit. But these inhalations are not very pleasant.



Mr. Madhusudan Dutt.

Cured of Asthma - Now a strong athlete - recently won 260 miles cycle race competition.

(Facing page 52)

Hypodermic injections of Adrenalin Chloride solution (1 in 1000) 3 minims to 7 minims in children, and $\frac{1}{2}$ c.c. to 1 c.c. in adults gives instantaneous relief during a very troublesome spasmodic attack. The attack is averted, if it could be given just at the onset of the spasm.

Exercises.—The exercises may be divided into three groups.—

Group I—Exercises Nos.—1, 5, (in a sitting posture).
33, 34, 34(a), 35, 36, 41, 44, 45.

Group II—Exercises Nos.—9, 18, 25, 17, 32, 32(a), 32(b),
64, 64(a), 37, 37(a), 37(b).

Group III—Exercises Nos.—14, 15, 24, {followed by a
brisk walk.

No exercise should be attempted during the spasmodic fits. But during the intervals, the exercises should be practised in the early morning in an open space, preferably if the weather permits, in a lawn, better in front of a vast expanse of water where the air is free from dust. The first group of exercises should be practised for about a fortnight diligently, before the second group is attempted. After about six weeks from the beginning, the third group may be started. As in chronic cases, along with the Emphysema, the patient usually develops a Dilated Heart, so the heart should be very carefully examined before the third group is attempted. Running should not be attempted until the patient's pulse rate be within 140 per minute after doing Exercise No. 15 forty times.

ASTHMA IN CHILDREN

About one-third of all the cases of Asthma in children have their onset during the first ten years of life. Boys are affected three times as often as girls. About 60 to 70 per cent. of Asthma in children are hereditary. Transmission appears to occur twice as often through the female as through the male.

The symptom of sudden onset of Asthmatic fits in children is due to two causes :—(1) The Toxic action of some food as fish,

meat, milk, eggs, wheat, potatoes. (2) The inhalation of certain articles, *e.g.* feathers, animal hair, etc. In infancy, the food reactions are common, and the reaction of inhalant articles are rare. In children over 10 years of age practically all reactions are of inhalations.

Types of Asthma in Children :—(1) Acute Bronchitic type, usually found in infancy—often has a sudden onset. Sneezing is very common, but not much of bronchial spasm is present. (2) Asthmatic Bronchitis—a recurrent type of Bronchitis. (3) True Bronchial Asthma as is found in the adults, is usually found in children over 5 or 6 years of age. The child may get a sudden relief after vomiting a large amount of mucus. (4) Hay Asthma associated with conjunctivitis, itching of the nose, watery discharge through the nose, sneezing and lacrimation. This type is very common in children before 4 years of age, but occasionally found in children of 7 or 8 years.

Treatment of Asthma in Children.—The bowels should be kept regular. In several cases of children suffering from Asthma, the infected tonsils and the adenoids have to be removed. These cases show temporary improvements. But in the long run the percentage of cure has been found to be negligible.

Diet.—Non-irritating also nutritious diets should be recommended.

In those cases of Asthma in which the cause traced to be infected tonsils, or adenoids, I have found a remarkable improvement by my system of breathing exercises.

Exercises recommended :—

Group I. Exercises Nos.—1, 2, 5, 9, 17, 18, 32, 33, 37, 37(a) and 37(b).

Group II. Exercises Nos.—25, 35, 10, 64, 64(a), 14, 15, brisk walk, or gradually running may be advised, after studying the condition of the heart,

CHAPTER IV

DISEASES OF THE LUNGS

EMPHYSEMA

It is a chronic disease of the Lungs in which the air vesicles become over distended. The walls between each air vesicle lose their elastic tissue, they get ruptured, and become atrophied. As a result of this, the walls of the air vesicles yield to the pressure of the contained air, and consequently get distended. The respiration is reduced much below the normal. The vesicular area available to aerating the blood is greatly diminished.

Causes:—In many cases it results from chronic Bronchitis, some from Whooping Cough, and many from Asthma. It is much more common in the male than in the female. People are prone to get Emphysema by certain occupations such as wind instrument blowing, blast blowing, etc. In many cases, it is associated with senile degeneration and chronic Bright's disease.

Symptoms.—Slight Emphysema is not always detected. It may become clearly manifested after repeated attacks of Bronchitis, as the patient becomes more and more breathless after each attack. The breathlessness of Emphysema is very peculiar, as in this, the chest remains permanently in an inspiratory position. Slight cyanosis is always present.

Physical signs.—In a typical Emphysema case, the chest appears to be barrel shaped (*see* Introduction, Fig. B, page 50). The expiration is much prolonged, there may be signs of Bronchitis. There is always universal and bilateral hyper-resonance, and it obscures the dullness of the neighbouring organs, *e.g.*, the heart, the liver or the spleen. The apex beat of the heart may not be palpable. The epigastric pulsation is always felt.

Many may live to a good old age with moderate degree of Emphysema, but it often predisposes, and adds seriousness to the other pulmonary troubles.

Treatment.—1. The concomitant Bronchitis should be relieved.

2. The Cardiac condition should be improved with Strychnine and Tinct. Cacti. Grandifloras. Quinine and Cod Liver Oil are very effective.

3. The elasticity of the lung tissue should be restored as far as possible. This could only be done with special breathing and compression exercises.

Exercises recommended.—Where the cause and the accompanying trouble is Bronchitis, the Bronchitis should be treated with expectorants, and the following exercises advised.

Group I—

Exercise No. 39.—Sit erect on a chair with the palms of the hands resting on the knees, the legs hanging down, or the feet touching the ground as shown in figure No. 103, and the chin touching the chest. Breathe in full pretty slowly (time covering 3 seconds). Throw the head backwards during inspiration, assume position as in figure 104. Breathe out, the chin touching the chest with a forward movement of the head, and assume position as in figure 103. —Repeat.

Exercise No. 35.—Sit erect on a chair as shown in figure 94, with the hands resting on the upper third of the thigh. Breathe in full and assume position as in figure 95. Mind that the sides of the chest expand with each inspiration. Then breathe out, by lowering the elbows simultaneously with slight pressure towards the sides of the chest, and assume position as shown in figure 94. Repeat. (number of movements 10 to 250).

Exercise No. 36.—Sit erect on a chair, looking at some object on the horizontal level, gripping the left hand with the

right, breathe in full, elevate the elbows to the shoulder level as shown in figure 96. Breathe out, and press the sides of the chest with the arms, and assume position as shown in figure 97. Repeat. (Number of movements 10 to 200).

Group II—When these exercises have been practised carefully for about 3 months, the patient can add Exercise No. 14 to the chart. After practising Exercise No. 14 beginning with 3 and increasing upto 50 times, along with the other breathing exercises mentioned above, the patient can start deep knee bends—Exercise No. 15.

Group III—After he could do 50 of these deep knee bends (starting from 5 times) the patient can be advised to start running, watching the heart conditions.

ATELECTASIS PULMONUM (Collapse of the Lungs.)

It is of two types :—1. Congenital.
2. Acquired.

Congenital.—In this condition the lung tissue has never been expanded since birth. This is due to some imperfect development, and is seen in very weak children who could not draw in the required amount of air. This is true Atelectasis.

Acquired.—In this the lung tissue which has previously expanded as usual, but due to some acquired trouble, such as Adenoid growths, Broncho-Pneumonia, etc., has subsequently collapsed. This is collapse of the lung proper.

Causes.—1. **Obstructions** due to the presence of :—

- (a) Tumour at the root of the lung, *e.g.*, Aneurism.
- (b) Adenoid growths, chronic enlarged tonsils in the throat. More often due to the thick mucous or muco-purulent secretion of Bronchitis, and as a result of Broncho-Pneumonia, Whooping Cough, etc., especially in children.

(c) Foreign bodies obstructing the larynx or the bronchus.

2. **Constriction** of the Bronchus caused by Cancer or by Aneurism, etc., in elderly people.

3. **Compression**.—Pleural effusion, enlargement of the heart, pericardial effusion, mediastinal tumours growing from the upper surface of the liver (hydatid), Cancer, Hydatid of the Spleen, Ascitic fluid, also ovarian tumours.

The diaphragm is an important structure in connection with respiration. The paralysis of the diaphragm, which occurs in Diphtheria, causes collapse of the lung. Certain forms of multiple neuritis and paralysis of the intercostal muscles, due to lesion in the upper dorsal portion of the Spinal Cord cause similar trouble.

Symptoms.—In Congenital Atelectasis the child is found to be very weak, and slightly livid with shallow and rapid breathing, the cry being very feeble. The lower part of the chest is drawn in with each inspiration, and the intercostal spaces are depressed. On auscultation, the respiratory murmur is found to be very faint. The collapse due to Bronchitis is rarely extensive enough to be detected by auscultation, the distribution of dullness being lobular and scattered. In the adults, when the collapse of the lung is due to paralysis of the intercostal muscles or the diaphragm, the movements of the affected side become very much limited, the physical signs being dullness and absence of breath sounds. Sometimes there is bronchial breathing. The Apex beat is directed more towards the affected side, and the healthy side being more hyper-resonant.

Treatment.—Discovery, and removal of the cause should be the primary principle in the treatment of this disease. In Congenital Atelectasis, the child should be kept in a warm and well ventilated room. The chest should be gently stimulated by friction. Bronchitis, Broncho-Pneumonia, Congenital Syphilis, etc., should be quickly cured by proper treatment. In adults, any concurrent pulmonary disorder that is present, should be treated promptly.

Exercises.—The following exercises should be attempted. But as the child cannot understand what to do and what not, an attempt should be made to perform the movements passively—by the Physical Instructor, while aiming at the proper performance of the inspiration and expiration as pointed out in the exercises, along with those passive movements.

Exercises recommended.—Exercises Nos. :—32, 32(a), 32(b), 33, 34, 34(a), 36, 37 37(a), 37(b), 40 and 41.

In older children and in adults, Broncho-Pneumonia, Congenital Syphilis, Rickets should be treated properly, and then the following exercises should be carefully attempted, after carefully chalking out the side of the lung collapsed.

Exercises.—

Group I. Exercises Nos.—40, 9, 41, 46, 35, 36 and 33 (lifting the arm carefully on the side collapsed, 34(a)—bending the side opposite the side affected). After following the exercises as mentioned in Group I for about 3 months, Group II may be practised along with Group I.

Group II. Exercises Nos.—5, 44, 17, 18, 19 and 19(a).

OEDEMA OF THE LUNGS

In this condition, the interstices of the lung tissues, the smallest bronchi and the air vesicles become full of serous exudations.

Causes.—The most frequent causes are Bright's disease and valvular diseases of the heart. Elderly people who have been suffering from mitral regurgitation of an advanced condition verging on to the stage of compensation failure, occasionally get Oedema of the Lungs. Sometimes this sudden and temporary Oedema of the lung cuts the patient's life short. In prolonged febrile diseases, *e.g.*, enteric or pneumonia, an acute condition known as "Hypostatic Congestion" may result. Pressure of some tumours or

an Aneurism on the pulmonary vessels may cause local Oedema of the lung. Sometimes pleuritic effusion causes Oedema of the lung tissues.

Symptoms.—Dyspnoea, Orthopnoea, sometimes Cyanosis, incessant cough and expectoration of abundant frothy serum are the prominent symptoms.

Treatment.—If heart disease be the primary cause, and the symptoms of Dyspnoea come on abruptly, treat the symptoms with a dose or two of stimulant expectorant mixture chiefly consisting of an alkaline mixture with Chloric Aether and Tinct. Stropanthus and start inhalation of Oxygen. Continue the inhalation with small intervals until the patient feels relief and falls asleep.

In case of Bright's disease when Oedema sets in, administer diaphoratics and purgatives and a vapour bath. Continue regular inhalations of Oxygen once in the morning and again in the evening, for half-an-hour each time.

In case of Valvular diseases of the heart, treat the heart symptoms first. When the acute trouble has passed off, the following breathing exercises should be attempted :—

Exercises Nos.—35, 33, 39, 5 (sitting on an armless chair), and 41.

To improve the general physical condition,—

Exercises Nos.—1, 2, 3, 5, 44, 21, 25, 32, 32(a), 32(b), 22 and 23.

WHOOPIING COUGH

It is an acute infectious disease attended with paroxysmal attacks of cough, followed by a long-drawn inspiration producing the sound "whoop". It is not only infectious, but is also contagious, apparently conveyed by the clothing and the sputum of the patient. Children are very much susceptible to this trouble.

Symptoms.—The period of incubation is about ten days. The onset is marked by a preliminary catarrh, or running from the

nose and the eyes, attended with paroxysmal dyspnoea and often drowsiness. In moderately older children paroxysmal cough and expectoration set in after the premonitory stage (24 to 48 hours) is over. The paroxysms of coughing consist of a series of short sharp coughs followed by a loud inspiratory whoop through the narrow half-closed glottis, and is sometimes followed by vomiting. The face becomes swollen. There might be seen some spots of sub-conjunctival hæmorrhage. The child may be playing apparently well, when it abruptly stops, seems distressed for a moment, by a short cough which is quickly followed by another, and so on without any intervening inspiration. The loudness of the cough becomes less and less after each successive effort, the number of coughs coming on at each paroxysm may be 10 to 15 in the course of 8 or 10 seconds, and then follows the long-drawn inspiration with a peculiar laryngeal sound "Whoop." Another spasm of short cough succeeds the former one. During the period when the child is struggling with this spasmodic cough, the face becomes congested, cyanosed and swollen. The eyes look as if they are bulging out of the sockets, the tongue hangs down from the mouth. Sometimes saliva tinged with blood comes out with the cough. Certain quantity of mucus is expectorated, and the fit comes to an end. For a few days the face remains swollen. The paroxysms may occur from 30 to 40 times in 24 hours and more at night than in the day. On auscultation, signs of bronchitis are more or less detected. There may be a slight rise of temperature, and in certain cases, no elevation of temperature is perceived at all, and the child may be apparently quite well in the interval between the attacks of coughing.

Complications.—Bronchitis and sometimes Broncho-Pneumonia.

Sequelæ.—Chronic Bronchitis, Emphysema or Tuberculosis of the Lung occasionally results.

Treatment.—Tinct. Belladonna 2 to 3 minims in young children, increasing upto 5 to 10 minims in chronic cases. The digestion should be well attended to, and the bowels should be kept clear,

Particular hygienic steps should be taken to keep the child in the open, or in a well-ventilated room. Change to sea-side is beneficial.

Exercises.—During the convalescent stage, the patient should be encouraged to go in for the following exercises—to be started in a passive way, helped by the masseur or the Physical Instructor, for some time, and then he can continue them for a long time.

Exercises Nos.—44, 5, 39, 37, 37(a), 37(b), 17, 18, 9, 64 and 64(b).

The child should be encouraged to run freely in the open air, provided the heart condition has improved.

PNEUMONIA (Inflammation of the Lung)

It is the inflammation of the substance of the Lung, and not of the bronchial tubes. It occurs in two forms—

1. Lobar Pneumonia or Croupous Pneumonia.
2. Lobular Pneumonia.

Lobar Pneumonia.—It is an acute inflammation of the lung.

Causes.—This malady attacks both sexes. It is twice as common in males as in females, and is more frequent in the adults up to the middle age. It is more common in winter and spring than in summer, and also when the weather is wet and cold. People with depressed physical and mental conditions are more susceptible than the lively and strong. People addicted to alcohol are more liable to be affected by this disease, and the mortality is greater in them as well as in old men. One attack is not a guarantee for the immunity. It is infectious as well as contagious. It may arise as the complication of a constitutional malady. Acute infectious fevers especially, make people susceptible to Pneumococcal Infection. The specific cause is the infection by *diplococcus pneumonia* of Frankel.

Morbid changes.—When affected by this disease, the spongy structure of the lung tissue is converted into a more or less solid mass,

The first stage of congestion—The lung becomes heavy. The capillaries are dilated with blood, and there are minute haemorrhages.

The second stage of red hepatisation—The organ becomes dull, red in colour, completely airless and solid. The contents of the alveoli consist of febrin containing red and white blood corpuscles, making any exchange of gases impossible.

The third stage of grey hepatisation—The solid condition still persists. The air cells and the alveolar walls are now crowded with leucocytes, the fibrinous exudation and red corpuscles are very small in quantity.

The fourth stage of Purulent infiltration—The lung tissue now becomes softer ; there occurs the disintegration of infiltrated masses filling the air cells. The lucocytes also become fatty and granular.

Physical Signs.—This is practically limited to the lower lobe. During the first or the second day no dullness is perceived, but the percussion sound is slightly impaired, and it gradually becomes absolutely dull. On auscultation, tubular breathing and fine cripitations are heard.

Symptoms.—There is a sudden attack of fever with a rigor, continuing with a temperature of 103° or 104° for 5 to 7 days. The fever comes down suddenly with a 'crisis', or sometimes gradually. There are pain in the side of the chest, dyspnoea, cough and expectoration of thick mucus stained with blood (rusty sputum).

The symptoms may be divided into different stages.

First Stage—It begins with a violent attack of shivering or rigor. The temperature rises to 102° , 103° or 104° . There is loss of appetite, furred tongue, and in some cases, eruption of "herpes" on the lips. There may be headache, severe pain in the sides "stitch". On auscultation, fine cripitations may be heard towards the end of each deep inspiration. The percussion note may still remain unchanged or less resonant than normal. There is slight cough with the "rusty" sputum or of bright red colour.

When put into a cup the sputum does not float, but sticks to the side or the bottom of the vessel.

Second Stage—On percussion, there is decided dullness over the part of the lung affected, with tubular breathing at first soft and distinct, which very soon becomes loud and metallic. Words whispered by the patient will be heard quite distinct through the stethoscope. Coarse crepitations may be heard sometimes distinctly consonating. During this stage the patient is usually confined to bed as he is very ill. The face is somewhat flushed, the eyes are bright, and there is distinct sign of distress, as the breathing is quick and shallow. The respiration may rise from 18 which is normal, to 40, 50, even up to 80 or so per minute. The pulse is quickened, but not proportionately to the respiration. Thus the pulse respiration ratio which in the normal condition is 72 pulse to 18 respiration, *i.e.*, 4 to 1 becomes 2 to 1 or even $\frac{1}{2}$ to 1. The temperature is kept at a high level 103° to 105° with slight variations. The viscid rusty sputum is coughed up with difficulty. The urine which is scanty and high coloured, contains plenty of urates in deposit, but less chlorides and sometimes a trace of albumin. The delirium is sometimes very marked. Then comes the stage of resolution often on the seventh or eighth day. The temperature, pulse and respiration come to normal usually in course of 10 to 12 hours. This is the stage of "crisis", which often comes with profuse sweating or diarrhoea. In several cases, the fever comes down by "lisis", *i.e.*, more gradually from the highest point to the normal, and the period of lisis occupying three to four days. The disease occasionally runs a fatal course in two or 3 days. If the crisis is not got over, death will probably supervene.

Complications and Sequelæ.—Pleurisy, Emphysema, Pericarditis, Nephritis, Peritonitis, Post-basis Meningitis, Peripheral Neuritis, Arthritis, Malignant Endocarditis frequently, and Jaundice rarely.

Treatment.—The patient at the first stage should be kept in bed, the bowels should be opened. The chest should be

strapped with a layer of Antiphlogistine next to skin, overlapped by a layer of cotton wool, and moderately bandaged. The Antiphlogistine should be changed every 12 hours. In Pneumonia, expectant treatment is really imperative. Firstly, the inflammation of the lung should be checked. Secondly, the heart should be carefully watched. Usually during the first stage when the pulse is bounding, and the fever is continuous, a mixture consisting of Diaphoretics with a little Ammon. Carb., and Tinct. Stropanthus should be given every 4 hours. The disease will now run its usual course. In the next stage, the chief aim should be to watch the heart, and according to the condition of the heart and the indication of the pulse, Strychnine and Digitalis should be administered. Alcohol may be administered in big doses as required. Sleep will give a lot of relief to the heart, and it should be procured by the administration of a proper dose of sulphonal. Inhalation of Oxygen is a very good remedy. It should be started early. This will relieve the troubles in breathing, and will vitalise the heart, by giving it some relief and tone. Oxygen is of little use when it is administered to a thoroughly exhausted patient who is practically dying. Hypodermic injections of Strychnine and Atropine are very good stimulants in old patients. When the crisis is over, and the temperature has come down to normal, Quinine and Tonics should be administered to strengthen the patient.

Diet.—Well-diluted milk should be given frequently during the fever. But no sooner the fever is off, mutton broth, milk with farinaceous foods and fruit juice should be given.

Exercise.—Soon after the crisis is over, very light breathing exercises without movements of the arms, should be attempted along with inhalation of Oxygen from an oxygen apparatus, as it averts Phthisis, Emphysema and Pleurisy which are usual sequelae of Pneumonia. In certain exceptional cases, the crisis does not occur, and the inflammatory condition of the lung tissue returns to normal very slowly. Exercise is really imperative in such cases.

Exercises Recommended.—Gentle exercises, especially breathing, should be advised, along with those exercises that aid the work of the digestive organs, and improve the general circulation.

There should be a set of exercises that are required for the stimulation of the bronchial tubes and the lungs, so that the secretions may be cleared out of the respiratory passages. The inhalation of plenty of pure air freely mixed with oxygen, will invigorate the lungs and consequently the heart. But these exercises should be all very light movements, so also the movements for the improvement of the digestion. But later on, little more strenuous types of exercises should be taken to improve the whole muscular system and the constitution.

Exercises :—

Group I.—to be attempted for about 2 weeks.—

Exercises Nos.—33, 35, 39, 5 (in sitting posture).

Group II.—for three weeks—

Exercises Nos.—41 with inhalation of oxygen (from an oxygen apparatus), 21, 5, 44, plus the exercises in Group I.

Group III.—for a month—

Exercises Nos.—3, 44, 9, 1, 3, 17, 18, 19, 21, 29, 30, 32, 32(*a*), 32(*b*), in addition No. 34, 34(*a*).

Group IV—after about 3 months from the date of crisis, all the previous breathing exercises mentioned above in addition to—

Exercises Nos.—14, 15.

PLEURISY

It is the inflammation of the pleural membrane. There are two different types of Pleurisy :—

1. Dry Pleurisy.
2. Pleurisy with effusion. $\left\{ \begin{array}{l} (a) \text{ serous.} \\ (b) \text{ Purulent (Empyema).} \end{array} \right.$

Dry Pleurisy.—It is the inflammation of the pleura without effusion. In this, there is a fibrinous exudation on the visceral and parietal layers of pleurae, and adhesions may be formed later, after the active symptoms are over.

Causes.—It may occur in an apparently healthy person exposed to chill, but is more common in people with gouty or rheumatic diathesis. It may be the result of many infective fevers, *e.g.*, Pneumonia, Scarletina, Measles, Influenza or Septicaemia. Extension of inflammation from the neighbouring organs as caused by Tuberculosis, Cancer and Embolism of the lung, also inflammation of the Liver, Spleen, the Heart (Pericarditis), Spine, Ribs, Lymphatic glands, etc., are responsible for Pleurisy in many cases. Large number of so-called simple pleurisy cases are of tubercular origin.

Symptoms.—The disease commences with a stitch-like pain in the chest on inspiration, attended with a chill or rigor. The patient does not always take to bed during this period. The temperature may rise up to 101° or 102° . There is furred tongue, loss of appetite and malaise. The patient may lie on his back, but more on the healthy side, as the pressure on the affected side against the bed causes pain in the inflamed pleurae of the same side.

On the affected side, some impairment of movement is observed. On auscultation, there is deficiency of vesicular murmur, and the characteristic pleuritic rub (like the sound caused by rubbing one piece of silk against another) is heard at the painful spot on the affected side. This pleuritic rub is the result of friction of the two layers of inflamed pleurae (parietal and visceral) rubbing against each other during respiration. The sound varies with the degree of friction, and this may be so high, that it can be felt if the

hand be placed on the chest. The friction sound is most marked at the angle of the scapula. Sometimes this inflammation undergoes resolution. Adhesion of those two layers (parietal and visceral) take place, and the friction sound disappears. But sometimes effusion of fluid takes place, and in such condition, the pain, also the pleuritic friction disappear. Cough is a sort of disturbing symptom in dry pleurisy.

Pleurisy with Effusion (serous).—Starting with the signs of dry pleurisy, there exudes fluid between the two layers of pleurae (parietal and visceral). The sound of the pleuritic rub disappears, and sign of compression and displacement of various organs, *e.g.*, the heart, spleen, liver, etc., take place. There is shortness of breath, especially marked on exertion. The patient now generally lies on his back, or on the affected side, to allow the greatest freedom of movement of the healthy side. There may be very slight cough, but no expectoration.

Morbid Changes.—In the first stage, there is dilatation of the vessels of the pleura, then follow the exudations of leucocytes and fibrin on the internal surface of the pleurae. When the inflammation subsides, these free surfaces of the pleurae get adhesions due to the organization of fibrin. Very often, the formation of fibrin is followed by an exudation of serous fluid, which may accumulate in the pleural cavity to the extent of 2, 3 or even 4 pints. The fluid has a specific gravity of 1015 to 1020, it may be a little low or even as high as 1030. It contains albumin, and is of yellowish colour, but sometimes it is tinged with blood.

In some cases of pleurisy with effusion, absorption of the effused fluid occurs in course of a few weeks. The layers of fibrin covering the parietal and the visceral layers, become partially organized by the growth of new vessels from the pleura, fibrous tissue is formed, and thereby permanent adhesions are formed between the lung and the chest wall.

Treatment.—Strapping the affected side is the first step that should be taken to limit the movements of the ribs. This will give

the patient a great amount of relief, and the inflammatory process is in some measure checked. The strapping should be done by applying broad strips of sticking plaster from the spine to the sternum, alternate strips passing obliquely upwards and downwards, till the whole of the affected side is covered. Linseed meal poultice may be applied to relieve the pain in the chest. The patient should be kept at rest. The diet should be milk and sago. Fruit juices should also be given.

As the disease becomes sub-acute and gradually chronic, counter-irritants are indicated. Among the counter-irritants, Tincture of Iodine should be applied on the affected side once daily, until the skin gets sore. If by this treatment the trouble does not disappear in a fortnight or so, effusion of fluid inside the pleural cavity is suspected. Diaphoretics, *e.g.*, Acetate and Citrate of Potassium should be administered. Later Diuretics such as Squill, etc., also Potassium Iodide should be tried.

Aspiration of the effused fluid is often recommended, as soon as the case is diagnosed as Pleurisy with Effusion. It should be tapped irrespective of the size, if it shows no sign of absorption after a fortnight from the date of its discovery. In some cases, fairly rapid absorption takes place after removal of quite a small amount of the fluid.

Exercises.—So long as the patient has not acquired complete convalescence, no strenuous exercise should be advised. There is a natural tendency for adhesions to be formed between the parietal and the visceral pleurae. The breathing exercises should be very carefully practised, to prevent the formation of adhesions as soon as the local inflammation is healed up. Again, sudden severe stretching movements should not be attempted as the adhesions which have already formed may break down, causing inflammation and consequent reappearance of acute pleuritic symptoms and trouble.

Attempts should be made to improve the general strength of the patient by nutritious and easily digestible diets, and also

by exercises suitable for the purpose. Over-stretching the lungs should be guarded against very carefully.

In the beginning, the following breathing exercises should be attempted :—

Group I. Exercises Nos.—35, 36, 37, 39, all very slowly.

To improve the general physical strength—

Group II. Exercises Nos.—1, 3, 4, 5, 9, 17, 18.

When the body has much improved, the next set of exercises to be practised are the following :—

Group III. Exercises Nos.—1, 3, 4, 5, 9, 17, 18, 19, 24, 32, 32(a), 32(b), 34, 35, 36, 37, 37(a), 37(b), 39, 15.

Pleurisy with Effusion.—Purulent (Empyema)—It is a collection of purulent or sero-purulent fluid within the pleura. It usually follows a serous effusion, but it may be purulent from the beginning.

Signs and Symptoms.—The physical signs are similar to those of pleurisy with effusion. But the resolution does not take place in due course ; the patient gets sweatings, shiverings and irregular rise of temperature.

Prognosis.—Empyema is always a serious affection. After healing, it is followed by sinking in of the chest wall, resulting in scoliosis.

Treatment.—Surgical interference is necessary. The pus is evacuated by resection of a portion of a rib. The subsequent scoliosis may be treated by exercise according to the defect that has occurred. Refer to the chapter dealing with *Scoliosis*.

PULMONARY TUBERCULOSIS (Tuberculosis of the Lung)

The attack of the lung by Tubercle Bacilli is manifested in two forms. In the first, there is formation of very small Tubercles throughout the body of the organ caused by the carriage of the Tubercle Bacilli through the lymph channels from other parts of the body. As a matter of fact there is a generalised infection of the body by Tubercle Bacilli. It is called Acute Miliary Tuberculosis of the Lung, causing inflammation of the lung tissue.

Symptoms.—The onset is very insidious. The patient complains of weakness, inability to do his work, loss of weight, sickness and headache in the beginning. The Bowels remain usually constipated. The urine contains albumin. There is irregular fever attended with bronchial catarrh. The spleen is almost always found to be enlarged. Later on typhoid stage develops.

The disease is almost always fatal.

CHRONIC PULMONARY TUBERCULOSIS (Phthisis)

It is a wasting disease. It is due to the chronic inflammation of the lung tissue infected by Tubercle Bacilli. The bacilli may be carried directly into the lung with the inspired air. They lodge and multiply at the apex, and spread gradually to the other parts of the lung. The air which consists of tubercle bacilli derived from Phthisical expectorations, has either been shot into the air in the neighbourhood of the patient by coughing, and then breathed in by others; or the phlegm expectorated from the mouth of the tubercle patient on the floor or ground, has become dry, and is then blown about with the dust in the air.

Morbid Anatomy.—Chronic inflammation is set up in the mucous membrane of the bronchial tubes and in the air cells with their capillaries and connective tissues. The air in the air vesicles situated at the apex of the lung, is not so readily changed as in the other situations, the consequence is that those dust particles contain-

ing the bacilli which are inhaled, reach this part, and settle down. There they set up irritation, resulting in a small localized ulceration of the mucous membrane. The morbid changes may be described in three stages.

1. **Congestion.**—There are inflammatory changes in the mucous membrane of the lung, causing thickening, increased secretion of mucus and shedding of epithelium. Due to the chronic inflammation and multiplication of cells, the walls of the air vesicles contain less air, the walls of the blood vessels become thicker and consequently narrower, resulting in consolidation.

2. **Consolidation.**—During the periods of congestion and consolidation, the patient may completely recover, if he is placed under good hygienic conditions. The production of plenty of white blood corpuscles "Leucocytosis" and the anti-toxins that are manufactured in the body of the patient, enable him to fight out the invasion of the bacteria. The affected lung tissue gradually gets replaced by fibrous tissue.

3. **Breaking down.**—If the bacilli are not killed, and fibrosis is not established early, the inflammatory changes go on. The blood vessels gradually get blocked in the original site of infection. The nutrition of the lung tissue that is supplied with blood by those vessels, is cut off, the tissue becomes dead and disintegrated, partly by the tubercle bacilli and partly by other pyogenic organisms that have got access into the lung with the inspired air. Thus a cavity is formed in the centre of the focus of the disease, and consolidation of tissues develops round its periphery. The central portion is formed into a caseated mass, and gradually the cavity goes on increasing. If any big blood vessel is situated in this diseased area, it becomes a victim to the process of disintegration, and its walls break down during an attack of coughing, or any severe strain. Haemorrhage will take place. In many cases, the patient may recover at this stage, if sufficient strength of his body could be maintained to overcome the bacilli. The consolidated lung tissue right round the cavity gets gradually

replaced by fibrous tissue. The contents of the cavity gradually dry up, and are transformed into a calcareous mass. If this process could not be checked, the bacilli go on disintegrating more lung tissue, and a stage is reached when the patient succumbs.

Physical Signs.—During the first stage, on auscultation feeble respiratory murmur with fine crepitations are heard at the apex of the lung, in the latter part of the inspiration. Sometimes harsh breathing with prolonged expiration is audible.

During the second stage, the following physical signs are manifested over the affected area of the lung :—

1. Flattening.
2. Impaired movement.
3. Increased vocal fremitus.
4. Dull percussion note.
5. Tubular breathing.

During the third stage, signs of consolidation in the lung are all present. Moreover moist clicking rales are distinctly audible.

When the disease is much advanced, and a cavity is formed in the lung, a "cracked pot" sound is heard on percussion, specially when the cavity is pretty large, or it lies more or less superficially ; also during the percussion the patient keeps his mouth open.

Causes.—Tubercle bacilli are the real cause of Phthisis. It is an epidemic disease, and widely exists in all communities amongst the civilized races. The conditions determining the development of the disease are (1) the virulence of the organism, (2) the susceptibility or low power of resistance to the disease in the patient and (3) the modes of infection.

The virulency of the disease may vary, either the bacilli must be particularly strong, or the power of resistance in the patient must be lower. The lowering of the power of resistance in the patient may be caused by :—

(a) Heredity—Inherited low resistance to tubercle.

- (b) Overcrowding and deficient ventilation, working in closed rooms in fumes of gas.
- (c) Deficient supply of food.
- (d) Frequent child-bearing in women and too much drain by lactation.
- (e) Living in damp and imperfectly drained soil.
- (f) Enteric fever.
- (g) Excess in alcohol.
- (h) Diabetes Melitus—the common cause in elderly patients.
- (i) Syphilitic Cachexia.
- (j) Diseases which weaken the lung tissue, *e.g.*, Measles Whooping Cough, Pneumonia, etc.
- (k) General weakness caused by over-work, sorrow or anxiety.
- (l) Deformed chest, *e.g.*, narrow, long, flat or compressed, with projecting shoulder blades. In these cases the normal movement of the chest is hampered. There is very slight movement of the upper part of the chest, rendering the apex of the lung weak. Due to this under-aring of the air vesicles, the lung tissues are not properly developed and naturally they become weak and get susceptible to the infection of tubercle bacilli.

Age is an important factor in the causation of this disease. Youths and young adults are affected most by this disease. People over 35 years rarely get this disease, unless the vitality is specially lowered by Diabetes, etc.

Symptoms.—1. Hectic type of fever (the temperature rises in the evening), either remittent or intermittent. The temperature ranging 99° in morning and 100° or even 101° in the evening. In several cases it is intermittent, having 98·4° in the morning, and reaching 100° or even 103° in the evening. This high temperature

is usually found in advanced cases. The evening temperature falls at night to normal generally with profuse perspiration.

2. Obstinate dry cough due to catarrh of the bronchial mucous membrane, aggravated during the Autumn season.

3. Haemoptysis,—blood with expectoration of mucus. The blood is bright red and frothy.

4. Rapid emaciation of the body, also general loss of strength.

Treatment.—There are five different types of treatment in vogue.

I. Remedial.—A few years ago the usual custom of treating a Phthisis case was to improve the strength of the patient by Cod Liver oil, Maltine and similar tonics, also antiseptics such as Creosote, Eucalyptus, etc., per mouth, inhalations of antiseptics and abodes in high altitudes, also liberal dietary and hygienic mode of life.

II. Symptomatic.—1. For cough which is a very common symptom of Phthisis,—small doses of Opium or Liquor Morphine with other common expectorants, *e.g.*, Tinct. Camphor Co. and Tinct. Scillac are useful.

2. Night sweats which are often very exhaustive in Phthisis may be dealt with by administration of Atropine or Zinc-Oxide with 1-6th grain of Extract of Belladonna.

3. Diarrhoea—Diet should be carefully regulated. Opium or Bismuth should be tried as required.

4. Pleuritic Pains—Hot stupe, or painting the painful part with Tinct. of Iodine.

5. Vomiting.—

(a) If preceded by nausea, it means trouble in the stomach. Bismuth should be prescribed,

(b) If the vomiting is caused by or preceded by coughing, hot drinks should be given before meals.

(c) If it is of a nervous type, opium is useful.

6. Haemoptysis.—The patient should be kept strictly in bed in a half recumbent posture. Ice should be applied (in an ice-bag) on the chest. The diet should be fluid, also cold, and given in a small quantity at a time.

III. Tuberculine Treatment.—Koch's Tuberculine (by Koch) is useful for diagnosis, but practically useless as a remedial or curative agent for Phthisis.

IV. Open-air Treatment.—

- (a) Continuous exposure of the patient to fresh and pure air night and day. Windows of the room should be kept open night and day, never shut, or there being no windows at all.
- (b) Sufficient and suitable food supply.
- (c) Suitable amount of rest at the febrile stage, and freedom from anxiety and excitement.
- (d) Systematic and scientific exercises taken in the early stage.

V. Exercise.—Exercise is not suitable to a Phthisical patient at every stage. The following points should be observed before any system of exercise is adopted.

- (a) The food must be in proportion to the exercise.
- (b) When the highest daily rise of temperature is above $100\cdot4^{\circ}$ no exercise should be allowed.
- (c) Exercise can only be allowed when morning temperature is normal and the evening temperature is below $99\cdot4^{\circ}$.
- (d) Exercise should be taken one hour before and two hours after meals.

Exercises Recommended.—Exercise by way of prevention is very much advisable in suspected Phthisis cases, or for youths with very delicate constitution, having inherited that low power of resistance to tubercle from Phthisical parents, having narrow chest,

living in bad hygienic surroundings, who have recently suffered from Measles, Whooping Cough, Pneumonia or other infective fevers affecting the lungs. The improvement of the general physical condition of these subjects should be the chief aim, and thereby the susceptibility to tubercular infection may be avoided.

For this purpose the following exercises may be attempted :—

Exercise Nos.—1, 3, 4, 5, 6, 7, 9, 17, 18, 19, 29, 32, 32(a), 32(b), 33, 35.

When the subject has become strong enough to perform these exercises for at least half an hour, he may attempt Exercises Nos. 14 and 15 in addition to the first set of exercises mentioned above.

CHAPTER V

DISEASES OF THE CIRCULATORY SYSTEM.

DISEASES OF THE ARTERIES.

(Inflammation of the Artery.)

Causes.—The inflammation may be caused by direct infection of the artery due to its contact with certain infective, suppurative or septic foci. Certain septic emboli may get impacted in the artery, start local inflammation, and spread onwards. It may also be caused by some toxin or poison circulating in the blood, and these may be Syphilis, Gout, Alcohol and certain irritating materials of specific fevers.

Large-sized arteries like the Aorta may get inflamed due to continuous overstrain.

Types of Arteritis.—1. Acute Arteritis.

(a) Local.

(b) General.

2. Chronic Arteritis.

Morbid Anatomy.—Acute Local Arteritis.—It is due to direct infection, when an artery is in direct contact with an infective process, as a result of which the artery gets softened, specially in its middle coat, and due to the pressure of blood that is flowing through, it yields, and becomes dilated. Aneurysms are formed locally, or there may be perforation.

Acute General Arteritis.—In this all the three walls of the artery are involved, they become thickened through multiplication of cells. Big arteries may lose their resisting power against the pressure of blood, and yield consequently.

Chronic Arteritis.—It starts in the inner surface of the artery. Small patches of inflammation are formed on the inner (endothelial) wall, and in course of time, these inflamed patches get sclerosed due to the increase of fibrous tissue in it. If this chronic form goes on

for some time, thickenings of a semi-cartilagenous form make their appearance. Gradually the middle (the muscular) and finally the external, *i.e.*, all the three coats are involved. In the smaller arteries, the innermost coat getting continually thickened, reduces the lumen of the artery to a very small size, causing what is called "*Endarteritis Obliterans*", giving rise to Thrombosis at the narrowest part.

ARTERIAL DEGENERATION.

Three forms of degeneration affect the artery.

1. Atheroma.
2. Arterio-Sclerosis.
3. Amyloid Degeneration.

Atheroma.—It is a sort of degenerative change in the artery.

Causes.—It is usually found in elderly people and alcoholics, also those who have suffered from Syphilis, Chronic Bright's Disease, Malaria or Gout. It is due to continual, physical and mental strain and increased blood pressure. It is found generally in the bigger arteries. But smaller arteries of the brain or the heart are usually affected.

Morbid Anatomy.—Due to chronic irritation caused by the passage of the blood (surcharged with gouty, syphilitic or other toxins) through the arteries, the innermost layer—the Intima—gets inflamed, and as a result of this chronic irritation some degenerative change is produced in the said layer of the artery. At first there is cell proliferation in the deeper layers of the Tunica Intima, which gives rise to milky white dull opaque patches transformed into fibroid tissue arranged longitudinally, or undergoing fatty degeneration. As soon as the fatty degeneration commences, those patches become yellowish and coloured, irregular in outline, and slightly elevated from the inner surface. Smaller patches are formed in the beginning, but gradually they grow bigger in size. These patches consist of fatty granules and colesterine crystals, which gradually approach towards the surface.

The contents gradually get swept into the general circulation, leaving a sort of raw surface in the Tunica Intima, which is called an Atheromatous ulcer. With this process of pathological degeneration, the walls of the arteries become thinned down, and stretched in certain spots with the pressure of the blood, causing local dilatation. Eventually the arteries get tortuous,

Symptoms.—When the Atheroma is extensive, the accessible arteries are hard to feel to the fingers, they are rigid as well as rough. Several persons with Atheroma may get on with apparently good health, but due to the loss of elasticity in the arteries, the pressure of blood always puts the heart muscle into tension, resulting in hypertrophy and dilatation of that organ.

Occasionally headache, vertigo and shortness of breath are observed in these Atheromatous patients. Sometimes there may be cerebral hæmorrhage due to rupture of some arterioles in the brain, also Hemiplegia, Angina Pectoris, Fatty Degeneration of the heart or Gangrene of the limb due to Thrombosis. There may be Aneurism due to local dilatation of the arterial walls.

Treatment.—Nothing much can be done to remove Atheroma in the Artery. But as soon as this condition is detected, steps should be taken to avoid any possible cause that leads to high arterial tension in the subject.

ARTERIO-SCLEROSIS.

It is a condition of thickening and hardening of all the Arterial coats more wide-spread and uniformly distributed in character, than in Atheroma.

Morbid Anatomy.—There is a form of chronic inflammatory change in the middle (media) and the innermost (intima) layers of the arteries. Due to multiplication of cells and profuse migration of leucocytes, there sets in a sort of thickening in those two layers. Sclerosis or fibrous thickening of these two inner layers are often found in the middle-sized or smaller arteries. In old age a secondary fibrous thickening of the Adventitia (external coat of an artery)

occurs, which is not calcification but a sort of granular degeneration of that tissue. There is not much tendency to dilatation of the arterial wall, but the hardness and loss of elasticity lead to high arterial tension as a prominent feature.

Causes.—1. Heredity plays a very important part in the causation of Arterio-Sclerosis.

2. Age. It is a disease commonly found in people in the latter half of their life.

3. Sex. Men are much more affected than women.

4. Toxic Blood State. This is caused by the presence of various poisons and irritating substances such as alcohol, lead or by diseases like Gout, Syphilis, etc.

5. Strenuous physical labour causes fulness of the arteries, puts too much strain on their muscular coats (media), causes increase of structures, and eventually brings on the degeneration of the muscular coats.

Symptoms.—There is high arterial tension which gives a characteristic reading on the sphygmomanometer of 150 to 300 mm. Hg.

The symptoms may be divided into two stages :—

1. **The first stage.**—The arteries become visible, also palpably thickened and cord-like at the wrist, elongated and tortuous at the temple. In the patient the physical activity and vigour gradually fail. The reason being that all the tissues and organs of the body are deprived of the proper nutrition normally affected by the systematic and regular supply of blood through the arteries, helped by that contractile and relaxing power of the muscular walls of the arteries.

There is breathlessness, also unusually rapid pulse after slight exertion, Occasional asthma-like dyspnoea is also experienced.

2. **The second stage.**—Failure of compensation of the heart gradually sets in during this stage. There is frequent Vertigo. Various degrees of hypertrophy and dilatation of the heart, also accentuation of the second sound are manifested on auscultation.

There are occasional attacks of Angina Pectoris. Haemorrhage in the brain and chronic interstitial nephritis due to sclerosis of the renal arteries are common in this stage.

Treatment.—As a matter of fact nothing materially can be done to remove the thickening of the arterial walls that has already taken place. But steps should be taken to arrest the progress as much as possible by improving the circulation and nutrition, also, by carefully treating the conditions of the heart.

The arterial tension should be kept down by a regulation of diet and habits.

The patient should live a very regular life, quite free from any physical or mental strain. Alcohol should be religiously avoided. Diet should be of a very small quantity. The amount of protein should be very much restricted. As regards medicine Sodii-Bicarb is said to be useful in reducing the sclerosis of the artery.

To improve the condition of the heart, massage with moderate pressure and passive movements are very important.

The following exercises are recommended.—

Exercises Nos.—3, 4, 5, 44, 11, 21, 22, 33, 32, 32(a), 32(b), 34, 34(a), 35, 46, 57 and moderate walking.

HIGH ARTERIAL TENSION (High Blood Pressure)

In normal conditions, when the finger is pressed lightly on the radial artery of the subject, the pulse completely collapses beneath the finger. If there is too high blood-pressure, the artery remains full between the beats. In some cases, it seems that the artery stands out like a cord, and if the finger be moved sideways with slight pressure, the artery seems to be rolling underneath.

A reading on the sphygmomanometer elicits the condition of the blood-pressure, *i.e.*, the amount of tension on the arterial wall caused by the pressure of the blood when circulating in the system. The blood-pressure is called high when the record in the sphygmomanometer indicates above the normal. The normal blood-pressure from 8 to 15 years of age is equal to 90 mm. Hg., from 15 to 20 years 100 to 120 mm. Hg., and from 21 to 65 years 120 to 135 or 150 mm. Hg.

According to Lauder Brunton the normal blood-pressure in man is 100 plus (age minus one-fifth of the age) mm. Hg., in the Sphygmomanometer. That is, the normal blood-pressure in a healthy man of 40 years of age should be $100 + (40 - 8) = 132$ mm. Hg.

The systolic pressure which shows more than 150 mm. Hg. is usually considered to be abnormal in a middle-aged man.

Abnormal records may be as high as 300 mm. Hg., and it may vary in different individuals and in different circumstances.

The technic of Blood-pressure in a Sphygmomanometer :—

The practical cause of pressure in the arteries is the contraction of the heart muscle, pushing the blood into and along the arteries against the resistance of the vessels. In the Cardiac cycle, this pressure varies at different periods of time. During Systole, that is the maximum period of contraction of the Heart, this pressure becomes highest. It falls during Diastole, that is, when the heart muscle is relieved from the contraction, it is taking rest, and is dilating. The lowest point of pressure is reached at the end of the resting period, that is, the period just before another contraction.

The instrument that is used to measure Blood-pressure in man as mentioned above, is called Sphygmomanometer. There are two types of this instrument usually found in the market. In one, the pressure is registered through a coil spring which revolves a hand (like the hand of a watch) on a dial. For clinical purposes this type is good enough ; but the more accurate type of instrument

is that, in which the pressure is measured by the height of a column of mercury.

For the sake of convenience, the Brachial artery is taken when measuring the Blood-pressure.

The subject should be asked to sit on a chair, or he may be lying down. But when making subsequent tests, the patient should be asked to sit or lie down as he did on the previous occasion.

A Sphygmomanometer consists of a compression-cuff made of a sort of rubber bag, a piston or a rubber ball for inflating the cuff, and a lever valve to deflate it. There is also a dial with an index needle like the hand of a watch. The dial is graduated into equivalents of millimetres of mercury, usually from 0 to 300.

The application of Sphygmomanometer.—Place the cuff on the left upper arm of the patient, wrap it evenly and pretty tightly around it, the first lap of silk being placed over the inner aspect of the arm, and buckle the final lap up between the cuff and the arm to keep it fixed.

Measurement of Blood-pressure.—There are two processes adopted for the measurement of blood-pressure.

The Palpatory process.—Place your fingers of one hand on the radial artery at the wrist of the patient's arm on which the cuff is applied, and with the other hand inflate the cuff by a few free compression strokes. Now there is generated such a high pressure in the system that the pulse at the wrist (under observation) disappears. Now wait for a moment, and see that there is no movement of the index needle on the dial. This indicates that the arterial pressure has collapsed completely, and there is a good margin of air pressure over. The outlet screw is now slackened enough so that the cuff is slowly deflated, the pressure gradually sinks again, and the pulse becomes faintly perceptible at the wrist. At the very moment when the pulse reappears at the wrist, the Systolic pressure is represented on the dial. Now the screw is opened more and more, and the pressure goes

rapidly back to zero, and the patient is freed from pressure. On its way back (to zero) the index needle is seen to make wide excursions to and fro on its vibrations. While reading on the dial, the point of maximum excursion will indicate the Diastolic pressure.

2. **The Auscultatory process.**—In this process, the reading of the pressure is made on the dial according to the sound heard through the Stethoscope. The pulse at the wrist is not regarded at all during this procedure. The small flat transmitter of a stethoscope is placed firmly in the bend of the elbow on that portion of the Brachial artery situated in the anti-cubital space, with the ear-pieces in the ears. The cuff which is tied round the upper arm, is inflated in a similar way as it is done in the Palpatory process mentioned above, until absolutely no sound is heard in the stethoscope. Now slacken the outlet screw to deflate the cuff. The first sounds that are heard are dull, indistinct, irregular beatings. These sounds may be neglected, as they are merely due to vibrations of the cuff. If the deflatory process is continued slowly, the sound in the stethoscope is suddenly changed into sharp, loud and rythmical clicks. Just at the point of this change of sound in the stethoscope, the point of Systolic pressure on the dial is indicated. The deflating is continued until the sharp clicking sounds change abruptly to soft blowing sounds. At the point where this change is heard in the stethoscope, the reading on the dial indicates the Diastolic pressure.

Causes.—Predisposing—Heredity has a great influence in the causation of high blood-pressure.

There is no age limit. But abnormal pressure is found usually in people over middle age.

As regards sex, men are more susceptible than women.

Exciting causes.—1. Habits :—

(a) Alcoholism.

(b) Sedentary habit, and want of sufficient physical exercise in-doors or out-doors.

(c) Excess of protein intake with the diet.

If the above-mentioned causes are allowed to work in the system of a middle-aged man for a long period, they produce some sort of toxin in the blood which acts directly on the walls of the capillaries, irritating, and thereby causing their contraction.

2. Severe mental strain and worry also cause high blood-pressure.

3. Several chronic diseases such as :—

- (a) Diabetes in people of middle age.
- (b) Chronic interstitial nephritis and granular kidney which cause imperfect elimination of the nitrogenous waste from the system.
- (c) Gout, which causes excessive retention of nitrogenous waste.
- (d) Lead poisoning.
- (e) Certain chronic lung diseases which lead to chronic deficient oxygenation of tissues.
- (f) Cardiac trouble such as Mitral Stenosis or Cardiac hypertrophy.
- (g) Constipation.
- (h) Plethora, causing an increase in the volume of blood leads to high tension on the arterial walls.
- (i) Sudden stoppage of bleeding from a bleeding piles associated with constipation.

Symptoms.—1. Persistent headache which may be occipital, frontal or vertical.

- 2. A persistent feeling of fullness about the head.
- 3. Some depression of spirit and disinclination for exercise.
- 4. Breathlessness on exertion.
- 5. Asthma-like paroxysmal difficulty of breathing occasionally experienced.
- 6. There is Albuminuria.
- 7. Haemorrhage in different parts of the body, e.g., Epistaxis, Haemoptysis, Retinal Haemorrhage,

bleeding from Piles, small cerebral haemorrhage (causing light stroke occasional).

8. Angina Pectoris.
9. The record in the Sphygmomanometer above normal.
10. The pulse may be felt rolling under the finger. This can be distinguished from Arterio-Sclerosis, as in the latter the typical cord-like hardness is felt beyond the site pressed by the finger.
11. On auscultation, the heart may be found to be enlarged, there is re-duplication of the first sound at the Apex, also accentuation of the second sound at the aortic area.

Prognosis.—High blood-pressure is not so serious if it be temporary. But if the trouble continues for months or years, the ultimate result may be grave.

Morbid Anatomy.—The continual high blood-pressure causes increased function of the heart which leads to hypertrophy of the muscular structure of the vascular system in general. If the trouble continues still further, degeneration of the muscular tissues in the artery and the heart follows. The degeneration is of a granular nature. As a consequence, the walls of the arteries lose their elasticity, also become hard and brittle. The hypertrophied heart gradually becomes dilated, and the condition of failure of compensation which is the result of its inability to cope with the increased peripheral resistance due to the rigidity of the arterial walls is manifested. Due to occasional undue pressure of blood, the rigid (consequently brittle) arteries give way. As the blood vessels of the brain have the least support, rupture of those arteries becomes very common.

Treatment.—The main principle of treatment is to keep the blood free from the toxin that is causing irritation to the walls of the arteries, and to relieve the strain on the circulation.

Regarding medicine.—Temporary relief could be attained by administration of Nitro-Glycerine or Sodium Nitrite, as these drugs reduce the blood-pressure by their vaso-dilator action. Calomel gr. 1 to 2 at night followed by a saline purge next morning, is of much value if administered once a week. Long continued administration of potassium iodide is recommended by many. Sodii. Bicarb ($\frac{1}{2}$ a dram dose) may be taken once or twice daily, to keep the blood alkaline.

Hygienic steps such as restricted dietary, healthy atmosphere both physical and mental, should be strictly adopted.

As regards diet, alcohol, also butcher's meat and other food materials rich in protein should be religiously avoided, so also Tea and Tobacco.

Skimmed milk or milk with moderate quantity of farinaceous food is the best form of diet in these cases. Fresh fruits easily digestible, and green vegetables should form part of the daily diet. This will cause the assimilation of sufficient quantity of natural carbonates which will enable the blood to remain alkaline.

The intake of fats should be very small, as this will cause acidosis in the blood.

Turkish Baths or Hot Air Baths relieve the pressure by dilating the cutaneous vessels.

Moderate, systematic and regular physical exercise, along with scientific massage and liberal intake of pure water, facilitate the elimination of the nitrogenous wastes, formed as a result of body metabolism.

The following freehand exercises are recommended :—

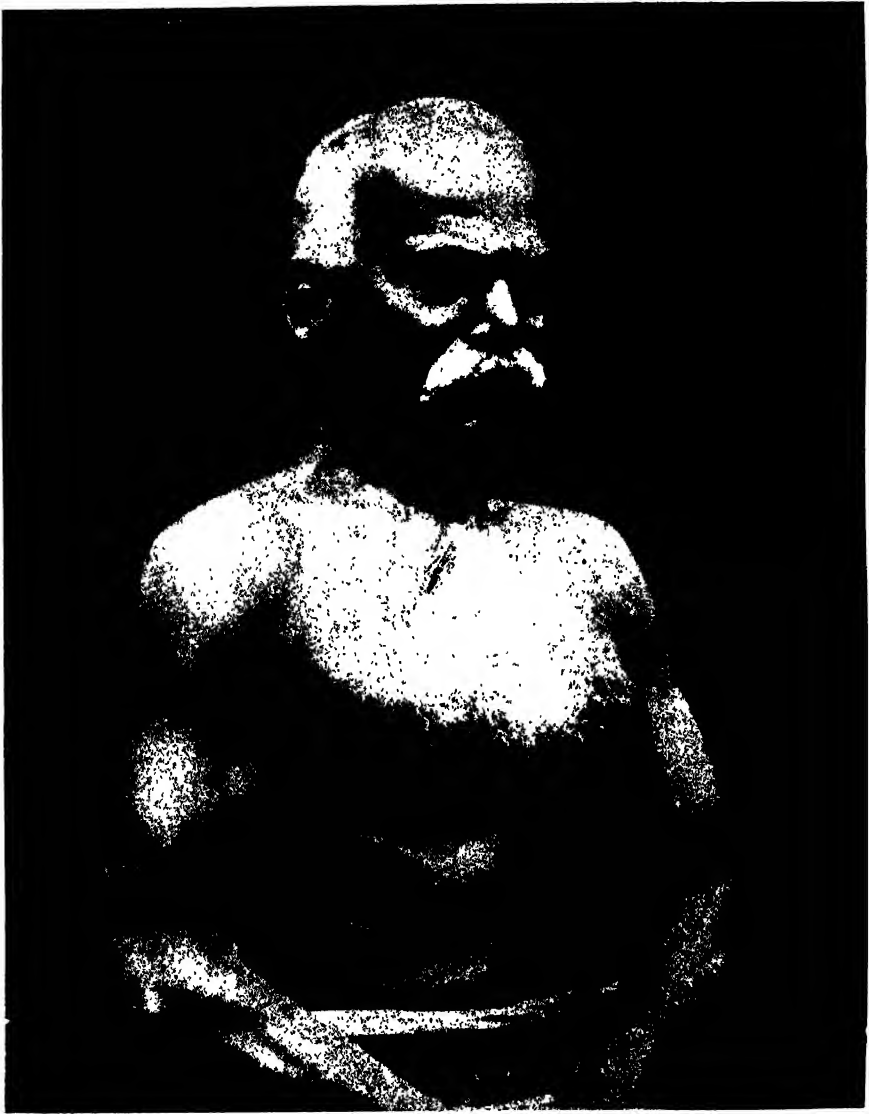
Group 1.—Exercises Nos.—33, 34, 34(a), 5, 44, 55, 9.

After practising these for about a month—

Group 2.—Exercises Nos.—1, 2, 3, 4, 11, 17, 18, 22, 23, 15 plus

Group I may be attempted.

Regular massage of the whole body should be done every day by a masseur for about half an hour. The massage should be performed when the patient is sitting on a chair or stool. But never



Dr. Balai Chand Dutt.

To Major P. K. Gupta.

My dear Major Gupta,

Many thanks for your kind Physical Culture Treatment which relieved me of my High Blood-Pressure when I came under your treatment at the age of 63. I am quite fit now, working for about 10 hours every day at my present age of 70 years. I think you could create wonders.

Calcutta }
12th July 1935. }

Yours affectionately,
Sd. B. C. DUTT.

(Facing page 88)

lying on the floor. Abdominal kneading should be strictly avoided, as it impedes the respiration, the diaphragm gets fixed, the venous circulation is obstructed, and there is consequent high pressure of blood in the cerebral arteries which is dangerous in such cases.

LOW ARTERIAL TENSION (Low Blood-Pressure.)

This condition is manifested by low tension of the pulse. The artery cannot be felt between the beats, the pulse strikes as it were rapidly under the finger, and rapidly declines. As a matter of fact, a double wave is felt, the second one being very small. In the Sphygmographic tracing for the cardiac pulsation, there will appear two beats. The pulse in this condition is called the "Dicrotic Pulse."

Causes—1. When dicrotism of the pulse is persistent in a subject otherwise in normal condition, it is usually hereditary.

2. It is found in people suffering from Neurasthenia, although there is no appreciable sign of any organic mischief in the heart.

3. Over-strain both physical and mental, want of nutritious food, and anxiety troubling the subject for a long time, cause low tension in the pulse.

4. In cases of valvular disease of the heart where there is failure of compensation, low tension in the pulse is manifested.

5. Tuberculosis which weakens the contractile power of the Heart muscle as well as of the walls of the arteries, causes low blood-pressure.

6. Endocrine inefficiency making the Heart weak.

Symptoms.—Along with the persistent dicrotic pulse, other concomitant symptoms such as Dyspepsia, Sleeplessness and General Depression are present.

Capillary pulsation is occasionally found in cases with low blood-pressure, and this can be shown by drawing a line along the forehead, when alternate blush and palor make their appearance.

Treatment.—The causes of low tension of the pulse should be sought for, and treated accordingly.

As regards medicine, Easton's Syrup does much good.

Diet.—Easily digestible and nutritious food should be given.

In Neurasthenic patients, the treatment should be that of Neurasthenia.

People with hereditary low blood-pressure, should not be very much anxious. Systematic moderate exercises with careful dietary will keep the patient all right.

Exercises recommended :—

Group I.—Exercises Nos.—1, 2, 3, 4, 5, 44, 9, 22, 23, 24
for 2 months and then—

Group II.—Exercises Nos.—17, 18, 19, 19(a), 10, 10(a), 27
plus Group I for one month.

Group III.—Exercises Nos.—14, 15, in addition to Group I
and II. A brisk walk should be taken after the
exercises, from the very beginning.

Diseases of the Veins :—

1. Phlebitis.—Inflammation of the walls of the Veins.
2. Thrombosis.—Coagulation of blood in the circulatory system. It may be in the arteries, veins or in the cavities of the heart.
3. Embolism.—Blockage caused by any foreign body which travels for some distance in the blood vessels, and becomes lodged at a place where the vessel is too narrow for its further progress.
4. Varicose Vein.—A vein is called Varicose when it has become dilated and more or less tortuous, consequently lengthened.

Although the four above-mentioned diseases fall under "Diseases of the circulatory system," they have been dealt

with in the Surgical chapters as they are diseases requiring more surgical than medical help.

Before proceeding to deal with the Diseases of the Heart, and the other organs constituting the circulatory system and their treatment, it is better that we should recapitulate the Physiology of the Organs of Circulation.

The contraction and dilatation of the different chambers of the Heart depend a great lot on the concomitant contraction and dilatation of the arterial system. The elastic muscular walls of the artery help the Heart in keeping up a certain amount of pressure of the blood in the system.

During the contraction of the left side of the heart, the maximum amount of pressure that is told upon the arteries, is called the Systolic Pressure. Again, when the whole heart is in a state of relaxation (Diastole), there is a similar relaxation in the arteries.

The pressure of blood in the system varies because of the following reasons.

1. Sex—It is higher in the male than in the female.
2. Age—It is increased as the age advances.

A reading in the Sphygmomanometer as already mentioned, elicits the condition of the blood-pressure in the individual. Lauder Brunton's theory of the estimation of Blood Pressure in man (which is 100 plus Age minus one-fifth of age) has been universally accepted.

3. Posture—If the head is kept downwards and legs upwards, there is some more pressure of blood in the Heart, and consequently in the cerebral arteries, due to gravity.
4. After a full meal—There is an increased amount of work put into the organs of digestion and consequently into the circulatory system. The pulse is full, and the Sphygmomanometer indicates a high record.

5. **Exertion**—Muscular exertion raises the blood-pressure. After 15 minutes of continuous and strenuous exercise, the blood-pressure becomes appreciably high.
6. **Mental Changes (disturbance)**—Such as excitement, worry, etc., stimulate the vasomotor system of nerves, and increase blood-pressure.
7. **Several chronic diseases cause rise of blood-pressure**—such as have been described under High Blood-Pressure.

Disturbed or deficient oxygenation of blood in the system causes congestion in the venous system. The blood gets surcharged with carbonic acid gas. This extra quantity of carbonic acid gas transmits greater friction on the arterial walls, and causes contraction of those vessels especially those smaller ones, when passing through them. This produces increased resistance to the circulation, and naturally an extra work is put on the Heart to overcome the resistance. This extra strain on the Heart enhances the rise of blood-pressure in the arteries.

In diseases of the Heart, where the Heart muscle is weakened, there is a consequent fall of blood-pressure in the system.

Cardinal and General symptoms of diseases of the Heart :—

(a) The cardinal symptoms are.—

1. Cyanosis.
2. Dyspnoea (Breathlessness).
3. Dropsy.

(b) The general symptoms are.—

1. Syncope.
2. Cardiac Pain.
3. Præcordial Pain.
4. Palpitation.
5. Cold Hands and Feet.
6. Fatigue and general sense of weakness.

Cyanosis.—Bluish tint appears on the skin. This change of colour is due to congestion of the skin, or to excess of blood in the venous system. It is a very serious symptom in a heart disease case. The change is mostly manifested in the lips, hands or toes.

Causes of Cyanosis.—1. Congenital Heart—in cases of a patent foramen ovale. There is continuous admixture of venous and arterial blood.

2. Defective, consequently deficient oxygenation of blood giving rise to this change of hue in the skin.

Cyanosis may come on suddenly or gradually.

When coming on suddenly, the causes are :—

1. Extension of a diphtheritic membrane blocking the air passages.
2. Whooping Cough (during the spasm).
3. Foreign body in the larynx.
4. Pneumothorax.
5. Sudden Paralysis of the Respiratory Muscles.

Causes which bring on Cyanosis gradually :—

1. Chronic Bronchitis.
2. New growths in the Bronchus, obstructing the proper passage of air into the lungs.
3. Gradual obstruction in the proper aeration of blood, due to acute miliary tuberculosis of the lung.
4. Compression of the lung by slow accumulation of fluid as in Pleurisy; slow-growing abdominal tumours.

Treatment.—The treatment should be according to the cause. In several heart cases where Cyanosis becomes an urgent symptom, venesection does a lot of good.

Dyspnoea.—(Breathlessness)—It is almost a constant symptom in Heart disease where the heart is not capable to cope with the

amount of work demanded by the system. In almost all the heart cases, it is manifested just after the patient runs fast for a distance, or gets up a few steps of a staircase quickly.

The breathlessness may not be usually manifested in cases of Heart Disease so long as the troubles with the valves of the Heart could be compensated by hypertrophy, *i.e.*, increased growth of the muscular structure of the cardiac walls. But as soon as the limit of hypertrophy is reached, and further pressure of work is continually forced on the heart, it begins to give way, that is, the muscular structure of the heart and consequently the heart itself begins to dilate, and dyspnoea occurs with the slightest exertion.

Causes.—

1. Increased formation of carbonic acid gas, or poisonous condition of the blood as in cases of chronic Bright's Disease or Diabetes, etc.
2. Pressure caused by other viscera surrounding the cardiac area, *e.g.*, the existence of a mediastinal tumour, a dilated stomach, ascites, accumulation of fat all over the cardiac surface in a fat subject.
3. Obstruction in the respiratory passages such as the larynx or trachea.
4. Emphysema or Oedema of the lungs.
5. Fatty degeneration of the Heart.
6. Atheroma of the Coronary Artery.

Treatment—The cause should be found out, and treated accordingly.

Dropsy.—Effusion of fluid starts to accumulate into the subcutaneous tissues or into the serous cavities.

The symptoms begin to manifest when the pressure of work becomes too much on the heart muscle.

In the beginning, the swelling is marked at the ankles, and extending up the leg, it is prominent in the evening, but diminishes, or almost disappears in the next morning.

Other signs and symptoms of weakness as well as dilatation of the Heart muscles or valvular diseases become evident.

The General Symptoms of diseases of the Heart :—

Syncope.—(Temporary Collapse.)—This symptom is a grave indication when it is due to an organic heart disease. Nervous faints which are more common, are, as a matter of fact, caused by less serious troubles of the Heart due to some functional derangement of that organ, and more commonly occur in young anaemic and nervous females, when the subject is affected by a sudden emotion, grief and so forth.

Treatment.—In nervous faints, the patient should be at once placed in a horizontal position with the head hanging low. Some diffusible stimulant, *e.g.*, Spt. Ammon. Aromat should be administered.

Cardiac Pain.—A feeling of constriction or even of suffocation is experienced, due to functional or organic trouble of the heart. This trouble is more often functional than structural.

When functional, it may be due to some pressure caused by a distended stomach with the formation of some gas as a result of the decomposition of food in it. It is felt mostly at the base of the Heart, increased in lying down, and there is Dyspnoea.

Pain, purely of nervous origin may sometimes be experienced with violent emotions.

Praecordial Pain.—(Pain felt outside the heart and Pericardium)—It may be due to intercostal neuralgia, intercostal rheumatism or pleuritic pain.

Treatment.—The cause should be ascertained, and treated with some local anodyne, *e.g.*, Belladonna, Anti-phlogistine and the like.

Pain due to organic diseases of the Heart.—It is a sort of diffused dull aching pain very acutely felt at the apex. The pain is felt when the diseased heart is put to any form of over-strain.

Palpitation.—It is a sort of fluttering sensation felt by the patient in the chest. In normal conditions, the position or movement of the muscular structure of the heart is not practically felt by the subject. But when there is palpitation, the patient becomes aware of the existence of the heart inside, and feels as if a substance equal to the size of a sparrow is fluttering inside the chest.

Causes.—It may be due to some functional derangement without any structural damage or change in the heart itself. It is frequently associated with emotions, worries, gastric disorder and anaemia. Occasionally excessive use of tea, coffee or alcohol causes palpitation. It is usually found in nervous females, and also in young adult males who have over-exercised their muscles.

Symptoms.—Along with the fluttering sensation felt by the patient, there is quick pulse, occasionally high arterial tension, breathlessness, sleeplessness and nervousness.

If the palpitation continues for some time, the indication is that the heart is getting hypertrophied.

Treatment.—First of all the immediate cause should be found out, and if possible removed. If there be any fear, it should be allayed with sympathetic suggestions. Plain and nourishing food should be given with a minimum quantity of protein in it. Tea, Coffee and alcohol should be avoided. No food should be given between meals, or within three hours before going to bed at night. Regular habits should be formed, and fresh air also outdoor exercises should always be encouraged with moderation.

Exercises recommended :—

Group I.—For the improvement of the heart condition and general constitution.—

(a) Exercises Nos.—33, 34, 34(a), 35, 5 and 44.

(b) Exercises Nos.—1, 2, 3, 4, 23 for a month, and to these add—

Group II.—For the improvement of the Digestive system.—

Exercises Nos.—9, 10, 10(a), 17, 18, 20 and (slow walking for 3 weeks) followed by a brisk walk.

Group III.—Exercises Nos.—1, 2, 3, 4, 44, 23, 9, 10, 10(a), 17, 18, 20, with outdoor exercises such as Tennis, etc., later on.

Cold Hands & Feet.—It is a sort of symptom usually found in heart disease. It is due to the weakness of the heart muscles causing slowness of the circulation, and the metabolism of the body falling below par.

Pulse.—It is a sense of expansion transmitted to the finger by an alteration in the shape of the artery, in response to the changes in the lateral pressure in the artery, caused by each cardiac contraction. The pulse is usually felt by the physician in the radial artery. When feeling the pulse, the following points should be noted :—

1. The frequency, *i.e.*, the number of beats per minute, as these pulse beats are synchronous with the heart beats.
2. The strength—this indicates the force of the heart beats.
3. The tension (the elasticity of the large vessels)—or in other words the amount of force required to obliterate the pulse. This elicits the state of the arterioles and the capillaries.

Normally the pulse is faster in the female, than in the male, and in children than in adults.

In the same subject, the pulse beats faster in the evening than in the morning. Changes of position of the body have got a great influence in causing a difference in the number of beats of the pulse. When the subject stands up, it beats faster by about 7 or 8 beats than when he is in a recumbent posture.

In the foetus, and in new-born infants, the average rate of the pulse is	about	...	140	per minute.
Child under 1 year	"	...	120	" "
Child under 3 years	"	...	100	" "
Between 8 and 14 years	"	...	90	" "
Between 14 and 21 years	"	...	80	" "
Between 21 and 60 years	"	...	70	" "
Above 60 or 65 years	"	...	85	" "

EFFICIENCY TEST OF THE HEART

The estimation of the capacity of the Heart to perform some strenuous work is usually required when a subject has to be examined for Life Insurance, a Recruit has to be enlisted as a soldier or a Civil servant has to be selected for his appointment. The standard of fitness in different cases is different. But whenever the subject is below the standard, he is rejected.

During enlistment, in the army, a recruit possessing murmur in the heart sound, should at once be rejected, as the subject is not likely to perform strenuous duties which will invalidate him in no time. He will not be able to carry on his duties for even a short length of time. Whereas in case of a civil servant engaged in some clerical job, may carry on his duties for a long time without incapacitating himself.

The capacity of the heart is estimated by observing the amount of increase of the pulse rate, the respiration and the blood-pressure immediately before and after some special active work such as doing some 20 deep knee-bends, or some 20 trunk bendings, (e.g., Exercise No. 9) or ascending a number of steps in a staircase equivalent to a height of 20 ft. (the time taken in ascending the staircase being 20 to 30 seconds).

The pulse rate and respiration in the average normal adult subjects should be as follows :—

	Pulse Rate.	Respiration.
Before Exercise Normal	72 to 80	17 or 18
After 20 Trunk Bendings (forward)	95 „ 110	25
After 20 Deep Knee „	105 „ 120	25 or 30
After ascending 20 steps	100 „ 120—150	25—30

In the normal individual, the pulse rate, respiration and blood-pressure increased after doing 20 Deep Knee Bends, 20 Trunk Bendings or ascending 20 steps in a staircase, usually come down to the previous normal condition in $1\frac{1}{2}$ to 3 minutes. Recovery not attained within 3 minutes should be considered to be due to inefficiency of the heart.

Effects of violent strain on the Heart.—A sudden and severe strain when put on the heart, tells more upon the system of a man used to sedentary occupation than on a man having active habits.

After running 100 yds. (sprinting) a regular athlete's heart will be seen (on a skiagram) not to dilate to any appreciable extent. Whereas under the same condition a non-athlete's heart will be seen to dilate from $\frac{1}{8}$ of an inch to $\frac{3}{8}$ of an inch, and he may drop down exhausted after running about 50 yds. or so.

Symptoms.—Symptoms that are usually manifested are:—Breathlessness, pain in the Præcordial area, fainting, exhaustion, coldness of the extremities, and sometimes irritable temper. Along with these symptoms, certain Cardio-Vascular signs such as diffusion of the cardiac impulse, increased rate of the pulse beats and respiration, also rise of systolic blood-pressure are noticed.

The heart styled as "Soldier's Heart" is usually observed in young recruits after a prolonged and intensive training, or after a strenuous over-sea expedition. If after the "Efficiency Test of the Heart" the subject's pulse, respiration and the systolic blood-pressure return to their previous condition within 3 minutes, he can be declared to be fit for duty. On the other hand if there be severe breathlessness, undue quickening of the pulse and slow return of the pulse rate to the previous condition, the indication is that the subject is unfit for duty.

In some milder cases, the subject can be allowed to join duty after suitable treatment. In severe cases, he should be declared permanently unfit, and consequently invalided.

TACHYCARDIA.

In this condition, the heart beats and the pulse become more frequent than usual. In the normal conditions, just after some strenuous exertions, the heart and the pulse beats become very frequent. They may be double or even more than that which is

experienced in the normal condition, but return to the previous rate in course of $1\frac{1}{2}$ to 3 minutes.

Causes.—It may be found in apparently healthy individuals, without any organic trouble in the heart. Tachycardia may be caused by nervous irritation, or emotions. It may be due to paralysis of the Vagus Nerve. In many cases, a sort of toxin (due to some Febrile condition) circulating in the blood, causes frequency of the pulse. In some special diseases, *e.g.*, Hyper-thyroidism, Tachycardia is a prominent symptom.

PAROXYSMAL TACHYCARDIA.

It is a sort of hysterical or nervous palpitation with quick pulse. It consists of a series of paroxysms coming on suddenly, at intervals without any definite pain in the chest. It may last for a few minutes or some hours. The rapidity of the pulse may come up to 150 or 200 or even 250 per minute. It may return to the normal condition abruptly again. The paroxysm may return after a week or a month. During the paroxysm, the face assumes an anxious or terrified appearance, the patient may complain of a feeling of heat all over the body, followed by a feeling of coldness of the extremities, or actual shivering.

Causes.—In the male, Paroxysmal Tachycardia occurs usually between 14 to 25 years of age. But in the female, it may occur in any period of life. It is due to some disturbance in the nervous condition of the Vagus or the Sympathetic. An acute physical or mental strain may be the immediate cause of an attack.

Treatment.—During an attack, Spt. Ammon. Aromat. or some such diffusible stimulant alone, or combined with a few drops of Digitalis is effective.

The patient may get over the attack, if at the beginning of that attack he closes his Clottis, and makes an expiratory effort.

During intervals, the patient should be advised to go in for some system of regulated physical exercise, take systematic rest, also

avoid all sources of excitement. Tea, tobacco and coffee should be religiously avoided. A good hygienic surrounding should be resorted to.

Exercises recommended,—

Exercises Nos.—

Group I.—Exercises Nos.—33, 34, 34(a), 35, 39 for a fort-night.

Group II.—Exercises Nos.—38, 5, 44, 46 and Group I followed by slow walking for three weeks.

Group III.—Exercises Nos.—19, 20, 9, 26, 27, plus Group I and II for three weeks.

Group IV.—Exercises Nos.—14, 15, plus Group I, II and III followed by a brisk walk or jog trot.

BRADYCARDIA.

(Slow Pulse.)

Slow pulse is sometimes found in people with normal health. It is said that Napoleon had a pulse rate below 40 per minute. If the slow pulse be associated with some heart trouble, it is a matter of much importance.

Irregularity of the pulse is almost always associated with slow pulse. In old people Bradycardia indicates dilatation of the Heart. It is also associated with sclerosis of the coronary artery, atheroma aorta and fatty degeneration of the heart.

If there be high arterial tension in a case of Bradycardia arterio-sclerosis is always suspected.

In cases of gastric troubles, slow pulse is an usual manifestation.

In several cases of nervous disorder, slow pulse may be a concomitant symptom.

ANGINA PECTORIS

This is an acute Paroxysmal pain in the region of the heart, associated with suffocation. It occasionally becomes fatal.

Causes.—It is usually found in subjects over 30 or 35 years of age, but more common in people above 50 years.

Men are much more subject to this trouble than women.

The predisposing cause may be ascribed to obesity, want of physical exercise, gouty diathesis, also chronic interstitial nephritis.

The exciting cause usually is exertion of an undue amount.

Symptoms.—The pain which is paroxysmal, comes on quite suddenly following some physical exertion during the first attack. There is an acute pain in the region of the heart, the pain radiates down to the left arm, and up to the left shoulder. There may be some tingling sensation in the fingers.

There is a sensation of tightness in the chest or suffocation, but there is no Dyspnoea.

There is an expression of torture in the face. There is deadly palor and clammy perspiration, and the patient collapses.

The pulse is variable, and sometimes irregular or quick and feeble; it sometimes stops altogether for a time. There may be very little change in the pulse, or it may be increased in rapidity.

There may be high tension in the artery during the attack.

Valvular murmurs are scarcely audible during an attack, but occasionally the aortic valvular mischief is found to be present.

The mind remains clear throughout the attack. After lasting for a few seconds or minutes, the pain quickly passes off. There may be passage of abundant pale urine.

Morbid Anatomy.—In case of death following a serious Angioid attack, fatty or granular degeneration of the heart muscle has been noticed. This is caused by arterio-sclerosis of the coronary arteries and their branches. The lumen of those arteries become narrow, and some of the branches become completely blocked.

The smaller (terminal) branches emerging from those blocked arteries, not having anastomosis with others, completely cut off blood supply to that part of the heart muscle which is supplied by them. For want of blood supply, that portion degenerates, dies, and eventually gets replaced by connective tissue.

Aortic stenosis is found in some cases ; and atheroma aorta in others.

Syphilitic gumma of the heart muscle may be the cause in comparatively younger patients.

Treatment.—During the Paroxysm, inhalation of Amyl. Nitras is efficacious as it relieves the high arterial tension in the heart, by dilating the peripheral arterioles.

During the intervals of the Paroxysm—in case where undue exertion heralds an attack, complete rest in bed as also mental repose is imperative.

The general mode of life should be regulated.

In Syphilitic cases, Anti-Syphilitic remedy should be adopted. Pot. Iodide helps in these cases.

When exposure to cold, sudden alteration of posture, too much stuffing of the stomach or smoking determines the attack, the mode of life should be changed.

In valvular or degenerative trouble of the heart, general heart treatment should be adopted.

INTERMITTENT PULSE

Symptoms.—The pulse at the wrist is missing at intervals, after some three or five and sometimes 20, 30 or 40 regular beats. The heart on auscultation is found to pause like the missing pulse beat. As a matter of fact, the heart does fail to beat. The ventricular contraction takes place very close to its previous contraction, and the transmission of the wave in the pulse is scarcely strong enough to be felt by the finger. The diastolic interval after this contraction is lengthened. Consequently the beat before and

after are separated by an appreciably long period of about twice that of one ordinary interval. This longer period of interval is counted to be the stoppage of the heart's action or the so-called intermission.

Causes.—This so-called intermittent pulse may be due to some toxic condition of the blood or disturbance in the nervous mechanism of the heart, and so it is functional.

It may be associated with cardiac valvular disease.

Intermission of the pulse may be temporary or habitual (chronic). If temporary, it is not at all serious, and can be made to disappear with exercise.

In old patients, the condition is usually some serious one, as in them, arterial degeneration is very often present.

In young individuals, this functional condition may be due to too much taking of tea, coffee or tobacco, or certain gastric disturbances caused by overloading the stomach or repeated chronic indigestion. In toxic or functional cases, during the intermission, subjective symptoms such as fluttering of the Heart, or sinking sensation in the cardiac region is felt.

In chronic gouty subjects, intermittency of the pulse is very commonly met with.

Treatment.—Tea, coffee or tobacco should be strictly forbidden. Physical and mental overstrain should be avoided as much as possible. Strict attention should be directed towards proper digestion. A dose of carminative mixture with the following combination may be administered half an hour before meal,

Sodii Bicarb	...	...	$\frac{1}{2}$ dr.
Spt. Ammon. Aromat.	...	...	$\frac{1}{2}$ dr.
Tinct. Nux. Vom.	...	...	5 m.
Tinct. Gentian Co.	...	...	20 m.
Aqua	... add	...	1 oz.

Diet.—Diet should be carefully regulated. Easily digestible and nutritious food should be given.

Exercises recommended.—

If due to some toxic condition of the blood, the following exercises should be attempted :—

Exercises Nos.—3, 4, 5, 44, 9, 14, 15, 19, 19(a), 27, 29.

If due to Cardiac-Valvular diseases :—

Exercises as mentioned under cardiac valvular troubles.

If the subject be constitutionally gouty :—

Exercises Nos.—1, 2, 3, 4, 5, 44, 9, 17, 18, 19, 19(a) and massage before and after the exercise, is imperative.

If due to dyspepsia.—The following exercises should be prescribed :—

2, 3, 4, 5, 44, 9, 10, 10(a), 14, 15, 27, 42, 42(a).

IRREGULAR PULSE.

It is extremely rare in healthy persons. But after sudden and severe mental or physical shock, irregular pulse is sometimes experienced. It is also experienced in old people. Nervous subjects addicted to excessive tea or coffee may have irregular pulse.

Irregularity of pulse is worse than intermittency. In acute diseases, it indicates cardiac exhaustion.

When there is no organic lesion in the heart, presence of irregularity indicates some gastric trouble, such as the result of a heavy meal, or Tympanites in the intestines due to indigestion.

Irregularity of the pulse may be present in cases of chronic gout or atheroma. It is also present in fatty or fibroid heart. The damage to the heart is estimated in these cases, by asking the patient to do 10 deep knee bends. If the irregularity disappears just after those movements, nothing serious should be suspected. But if it does not disappear, something serious must be the condition.

HYPERTROPHY OF THE HEART

It is an increase of the muscular substance of the walls of the heart, usually causing an unnatural distension of the cavity. In

some cases the size of the heart is increased, but the cavity remains as normal.

There is an increase in the weight of the heart. In the normal conditions, the heart weighs about $9\frac{1}{2}$ ounces in men, and $8\frac{1}{2}$ ounces in women. In the hypertrophied condition, it may be increased to 12 ounces in the male or 10 ounces in the female, and in certain cases, it may be even 20 or 15 ounces respectively.

Physical signs and symptoms.—The area of praecordial dullness is increased. The apex beat is heard at somewhat below its normal position. The impulse is forcible, and of the heaving type. If the left ventricle of the heart is hypertrophied, the praecordial dullness is increased towards the left. In case of an increase of the right ventricle, it is increased towards the right. On auscultation, the first sound of the heart is prolonged, muffled and less audible.

With exertion, a sense of discomfort or even actual pain is felt. Dyspnoea and even Syncope are also met with.

Sometimes, the patient is indeed unaware of any trouble in his heart, although there may be thumping in the chest, and throbbing in the head or occasional breathlessness.

In adolescent subjects with hypertrophied heart, nothing unusual is observed, except some irregularity in the cardiac beats and rise of blood-pressure.

Causes.—Cardiac hypertrophy is always the result of some obstruction in the circulation. The obstruction being either in the Lungs due to Emphysema or Bronchitis, or in the general circulation due to some valvular disease of the heart, or atheroma in the artery. Due to the obstruction, the heart has to cope with the pressure of work demanded from it. As a consequence of an increased effort to overcome the obstruction, there is increase of work of the cardiac muscle, and naturally there is increased growth of the heart itself.

Heredity has a great influence in causing hypertrophy of the heart. Careless training of young adults during exercises, sports and public competitions causing repeated overstrain, very often

give rise to hypertrophy of the heart. Untrained Athletes are mostly susceptible to this trouble, whereas a regularly trained athlete never shows any sign of hypertrophy.

Rich diet causes obesity, and reflexly irritates the heart, so also repeated emotions cause hypertrophy of the heart.

Juvenile hypertrophy of the heart is very common, as in this period of life the heart often develops before the other parts of the body.

Hypertrophy may take place in the left and the right ventricles, or in the auricles.

Hypertrophy of the Left Ventricle.—The left ventricle has to do the greatest amount of work in propelling the blood from the heart to the periphery, through the vast number of branches of the arterial system. Whenever there is any obstruction in the system, the pressure tells upon the left ventricle directly, so it is most often subject to hypertrophy.

Treatment.—Hypertrophy of the heart is the Nature's process of compensating the obstruction. If the obstruction is removed, the heart gets its normal condition.

The first step should be to find out, and remove the cause of obstruction in the circulation, also relieve the heart of its work partially. So that the hypertrophy is maintained up to a certain limit, and the compensation is established.

To attain this end, the general nutrition of the body should be improved by reasonable and easily digestible diets, regulating the bowels with laxatives, and thereby lessening the high tension in the circulation, and giving a certain amount of relief to the heart's work by avoiding strong and sudden physical exertion, administering baths, encouraging passive movements and massage, also systematic and well regulated resistant exercise.

Juvenile Cardiac Hypertrophy should be treated by general strengthening of the body, so that the parts of the body other than

the heart will get proper development, and the relative development of the heart with the rest of the body would become normal.

The following exercises should accordingly be prescribed :—

Group I.—Exercises Nos.—1, 2, 3, 4, 5, 8, 44, 32, 32(*a*), 32(*b*).

Group II.—Exercises Nos.—40, 42, 42(*a*).

Group III.—Exercises Nos.—9, 19, 22, 24, 25.

Group IV.—Exercises Nos.—13, 54.

The Group I should be first practised for about 3 weeks, and then Group II may be added to the programme which should be practised for 3 weeks when Group III will be added. Continue this for about 2 months. Then add Group IV, and practise all the groups together for at least 6 months.

CARDIAC DILATATION

When there is an obstruction in the circulation, and an extra demand of work is made upon the heart, it begins to get hypertrophied to cope with the demand. But when it fails to keep pace with that extra demand told upon, it starts to dilate. In other cases where the heart begins to dilate from the very beginning without any hypertrophy, the cause is faulty nutrition of the heart muscle.

Causes.—Sudden and violent physical strain, which an unaccustomed normal heart cannot stand, causes the weak cardiac muscle to yield, and as a result the heart dilates.

When a sort of persistent strain is put on the heart, due to obstruction in the circulation caused by cardiac valvular disease, Arterio-Sclerosis, Chronic Bronchitis or Emphysema, the cardiac muscle gradually yields, and the heart dilates.

Myocarditis or other degenerative changes in the heart, promoted by fatty, fibroid or senile degeneration, like Sclerosis of the coronary arteries, also followed by Chlorosis, Anaemia prolonged infective fevers or Acute Rheumatism cause the ventricular walls to dilate without any hypertrophy.*

Symptoms.—On exertion, there comes on shortness of breath and palpitation. There is rapid also irregular pulse and occasional syncope, dyspepsia and consequently defective nutrition. If the patient is put to a sudden strain of forced athletic exercises, there may be faintness, syncope, vomiting, or total incapacity for any further muscular strain, or even death.

Treatment.—During acute troubles, diffusible stimulants such as Brandy, Chloric Aether, etc., are useful, and a long period of rest should follow.

To give tone and strength to the heart muscle and its nervous mechanism, rest also light and nutritious diets should be recommended. As regards medicine, Digitalis or Stropanthus should be prescribed. Purgatives should be occasionally given in order to relieve the system of the venous engorgement.

After sufficient period of complete rest, passive movements of the limbs and massage should be advised.

The masseur should perform the following movements with the patient's limbs and the trunk as shown in Exercises Nos. 39, 5, 3, 4, 44, 57, 32, 32(a), 32(b), 21, 22, 30, 40, 41, 42, 42(a).

After the performance of each exercise helped by the masseur, the patient should be given inhalations of oxygen through the funnel of an Oxygen Apparatus for 2 minutes.

This set of exercises should be followed by massage, with very light pressure to start with. Later on, more vigorous massage should be given by the masseur. The patient should be made to inhale Oxygen through the funnel of the Oxygen Apparatus held at his nostrils throughout the period of the massage. This inhalation of Oxygen should be continued for about 15 minutes.

After the passive movements, and the massage continued for about a couple of months, when the condition of the heart has improved, and signs of general physical improvement are manifested, the patient should be asked to perform those exercises as mentioned above by himself (without the aid of the masseur).

The inhalation of Oxygen and massage should be continued as before.

VALVULAR (ORGANIC) DISEASES OF THE HEART

In such cases, there is organic change in the heart, causing either obstruction or incompetence.

Obstruction (Stenosis).—It occurs between the ventricles of the heart and the great arteries, or between the auricles and the ventricles.

Incompetence (Regurgitation).—that is inability of one or more of the valves of the heart to close completely during contraction of the auricles or the ventricles.

These two conditions may occur singly or combined, at any one of the four orifices of the heart.

These troubles usually affect the left side of the heart which is susceptible to "Endocarditis" the chief cause of these valvular troubles.

Causes.—1. **Endocarditis.**—Any infectious disease, and especially acute rheumatism may give rise to Endocarditis. The valves being the prolongations of the Endocardium into the orifices, with the inflammation of the Endocardium, these valves may get inflamed.

The infective organisms circulating in the blood find an opportunity to get access into these valves as they are always exposed to mechanical irritation. The inflammation leads to ulceration, and with the healing of the ulcer, cicatricial contraction is produced in one or more of the flaps of the affected valves. As a consequence, the margins of these valves do not meet during the contraction of heart, and in this way produce "incompetence."

In some cases, the ulcerated margins of two segments of a valve lying close to each other coalesce together, due to adhesion during the process of healing. As a result, the orifice where the valves are situated, becomes contracted causing "Stenosis,"

In young adults, acute Endocarditis affects usually the mitral valve. In people of advanced age, chronic degenerative changes affect usually the aortic orifice.

2. Alcoholic, Gouty and Syphilitic Diatheses may cause Endocarditis which comes on insidiously. When the poisons responsible for those aforesaid diatheses are circulating in the blood, and the subject is forced to unusually strenuous labour, the aortic orifice is affected.

3. In people of advanced age, persistent high tension due to arterial sclerosis, or obstruction in the lungs due to chronic bronchitis, may affect the orifices of the left or the right side of the heart respectively.

4. Atheroma of the aorta in middle life, causes dilatation of the aorta. This process extends to the area of the valves at the aortic orifice which is also dilated. Consequently, during Diastole the valves at this situation do not meet.

5. Due to prolonged and excessive amount of muscular strain, a large number of athletes are found to suffer from sclerosis of the aortic valves.

Symptoms.—Sometimes no subjective symptoms are detected in cases of valvular diseases of the heart, until the heart is examined by a physician under the stethoscope. That is to say, the process of compensation is going on during this period. At first the heart undergoes the process of overgrowth of its muscular structure (Hypertrophy). Sooner or later the Hypertrophy gives way to dilatation, and the symptoms peculiar to dilatation of the heart as mentioned under cardiac dilatation are manifested.

Certain general symptoms common to all forms of cardiovascular diseases may also appear.

Prognosis.—So long as the compensatory hypertrophy is going on, immediate danger of life is not expected, but the whole question depends upon the condition of the cardiac wall. When such symptoms as palpitation and dyspnoea increased by slight

physical strain or emotion, acute pain in the cardiac region, or syncope make their appearance, it is understood that the compensation is giving way.

In Aortic Stenosis, irregularity of the pulse is a grave sign. In mitral cases intermittency is not always of so serious an import.

So long as the dilatation is not advanced, back pressure is not produced. But in advanced dilatation with thinning of the cardiac walls, there comes on back pressure in the lungs. In case of an attack of Bronchitis when there is back pressure in the lungs, sudden oedema of the lung may be produced. This usually takes place where the aortic lesion is the cause of the back pressure in the lung.

In mitral troubles, there may be back pressure in the system in general.

FATTY INFILTRATION OF THE HEART

Morbid Anatomy and Physiology.—In this condition, the surface of the heart becomes covered with large deposits of fat, which start as an overgrowth of adipose tissue beneath the Pericardium. This deposit of fat becomes so thick, that the muscle fibres of the heart are scarcely visible from the surface. The fat also deposits between the muscle fibres hampering the action of the heart. Practically the power of contraction of the heart, and consequently the power of propelling blood into the distantly situated tissues are much lessened.

Symptoms.—The heart-sounds are faint and muffled, and the pulse is thin and feeble.

A sort of tightness and weight in the chest are always felt by the patient. There is Dyspnoea on slight exertion, with an occasional attack of Syncope.

Causes.—There is a hereditary tendency to fatty infiltration of the heart. Rich food taken in excess, want of physical exercise causing diminished metabolism in the system, eventually cause obesity and consequent accumulation of fat in the heart.

As in obesity, defects in the glands of internal secretion are also responsible for causing fatty infiltration of the heart.

Treatment.—The treatment should practically be on a line similar to that indicated in the treatment of obesity, in which the heart is usually involved. Too rich and excessive diet should be avoided. Alcoholic drinks should be forbidden. Drinking of water during meals should also be avoided. It should be drunk usually half-an-hour before or two hours after the meal.

Physical exercise.—A systematic and well-regulated type of Physical Exercise should be recommended. So long as the patient is weak, and the other symptoms of weak circulation are present, general heart treatment should be adopted. But as soon as some signs of improvement become manifested, active exercises should be prescribed, and finally the patient may go in for more vigorous exercises.

Care should always be taken to undergo the exercises suitable for removing indigestion and constipation.

Exercises :—

Group I.—Exercises Nos.—33, 34, 34(a), 35, 5, 44 followed by a slow walk.

Group II.—Exercises Nos.—1, 2, 3, 4, 5, 44, 23 and moderately brisk walk.

Group III.—Exercises Nos.—9, 10, 10(a), 17, 18, 20 and a brisk walk, plus Groups I and II.

Group IV.—Group III, followed by a brisk walk or a moderate jog trot.

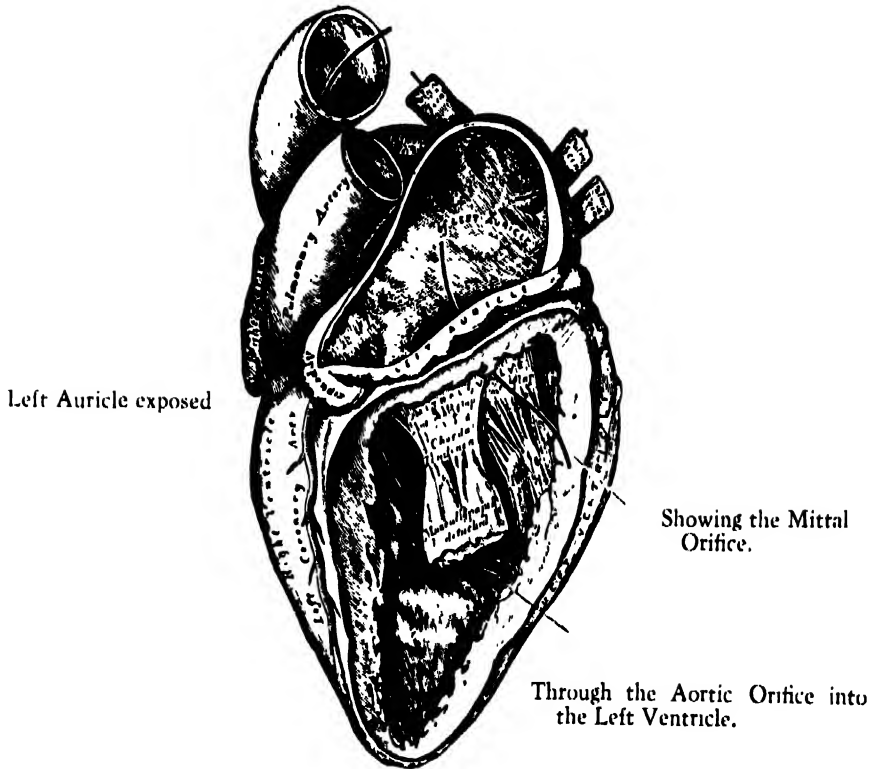
MITRAL REGURGITATION

When the left ventricle of the heart becomes dilated and hypertrophied, the mitral valves do not close completely during the contraction of the ventricle, and the following subjective symptoms manifest themselves.

1. There is a systolic murmur distinctly audible at the apex. This murmur is directed towards the axilla, and also behind at the angle of the scapula.
2. There is hypertrophy of the left ventricle, causing the "impulse" to be displaced downwards and outwards beyond its normal position.
3. There is soft compressible pulse.
4. Due to back pressure in the circulation, there is accentuation of the second sound.
5. There is cyanosis also shortness of breath.
6. The liver is congested, smooth and enlarged, reaching sometimes down to the level of the umbilicus.
7. The skin is slightly jaundiced, the cheek and fore-head assume a slightly yellow tint, while the lips are deep red.
8. There is congestion of the spleen.
9. Trace of Albumen is found in the urine, but the quantity of the albumen varies inversely to the strength of the heart muscle.

Morbid Physiology.—In Mitral Regurgitation due to the dilatation of the left ventricle, the mitral valves of the heart fail to close completely during its contraction ; so part of its contents gets retarded, and flows back into the left auricle. Naturally, the volume of blood forced into the Aorta is less than what occurs in normal condition ; and so the systemic circulation becomes delayed and low. This is manifested by "soft pulse". Again, the portion of the blood that has flowed into the left auricle, causes it to be partly filled ; and the blood from the pulmonary veins cannot easily empty itself into the auricle, causing a severe amount of retardation of blood in the pulmonary veins, and the capillaries, causing engorgement in the pulmonary system. The rate of diffusion between the oxygen from the inhaled air, and the carbonic acid gas with which the venous blood in the Alveoli of the lungs are surcharged, is diminished. Consequently, there is an increased amount of carbonic acid gas in the system, resulting in cyanosis and shortness of breath.

Showing the Aortic Orifice

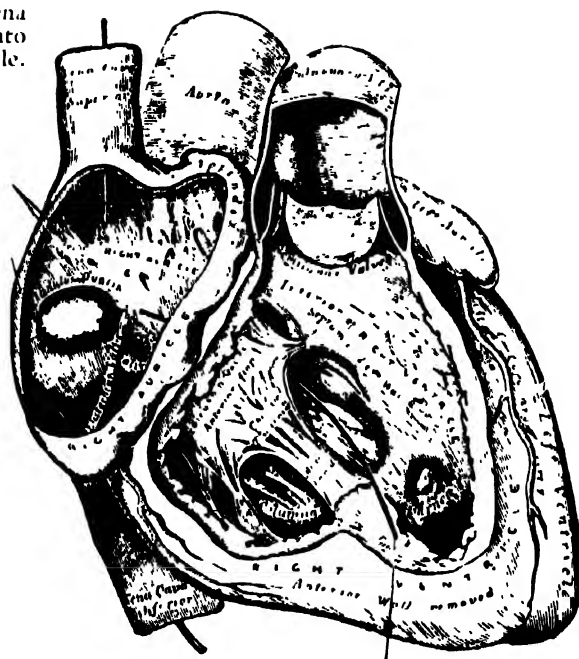


Heart -Showing the interior of the left Auricle and the Mitral Valve.

(Facing page 114).

Superior Vena
Cava opening into
the Right Auricle.

Right Auricle
exposed



Showing the Tricuspid Orifice

Heart—Showing the interior of the Right Article and Right Ventricle.

(Facing page 115).

Nature tries her best to improve the condition in a case of Mitral Regurgitation by a compensatory Hypertrophy and Dilatation. Nature could be helped by temporary rest in bed, with easily assimilable diet, and moderate quantity of fluid intake. During this sort of treatment, certain part of the heart recovers its strength, specially the musculature of the right ventricle improves, and the blood is forced more powerfully through the pulmonary system. The flow of blood from the pulmonary veins to the left auricle increases, and the latter becomes consequently more dilated to accommodate the flow of blood rushing from the pulmonary veins, also the quantity that regurgitates from the left ventricle. The muscles of the left ventricle increase in size in order to cope with the increased amount of blood poured into it from the dilated auricle. This increase in size (hypertrophy) of the left ventricle helps to improve the systemic circulation by forcing almost the normal volume of blood into the aorta, and thence to the systemic circulation.

MITRAL STENOSIS

Morbid Physiology.—In Mitral Stenosis, the left auricle of the heart is more affected than the left ventricle. It cannot pour out its contents completely into the left ventricle due to the constriction of the Mitral Orifice. So naturally, there sets in a sort of back pressure in the pulmonary system. A less quantity of blood is poured from the left auricle into the left ventricle, which in its turn pours out less quantity of blood into the Aorta than it normally does. A small hard pulse is felt, and the symptoms of general weakness manifest.

The left auricle gets hypertrophied as it tries to overcome the obstruction. But the left ventricle retains its normal size.

Symptoms.—1. On palpation, a characteristic pre-systolic thrill is felt over the apex of the heart.

2. A "pre-systolic" bruit or the auricular systolic murmur as it is called, is heard over the apex. The bruit is rough and rumbling in character, and simulates an accentuated first sound.

3. A re-duplicated second sound is distinctly heard at the side of the apex.

In advanced cases, the pre-systolic murmur disappears.

General Symptoms.—There is passive congestion in the lungs. The patient suffers from cough, with plenty of mucous expectorations. Haemoptysis is frequently and early met with. The liver is enlarged, Cyanosis is less marked than in mitral regurgitation.

In a case of Mitral Stenosis, the compensation may be effected by dilatation, as well as increase in strength of the left auricle, enabling it to accommodate more blood flowing from the pulmonary system, also overcoming the obstruction in the constricted mitral valve. The increase of strength in the muscle of the right ventricle would overcome the disturbance of circulation in the pulmonary system.

AORTIC REGURGITATION

Morbid Physiology.—In Aortic Regurgitation, during the relaxation of the left ventricle, some amount of blood regurgitates into it through its imperfectly closed valves. The amount of pressure in the Aorta is lowered, and the flow of blood into the system is consequently low.

Causes.—1. Circulation in the blood, of toxins caused by Syphilis, Gout, Infectious fevers, and poisons such as lead or Alcohol.

2. Lodgment of infective materials at the aortic walls, thereby causing local endarteritis.

3. Excessive use of the arms as is commonly found among sawyers, or blacksmiths, causing frequent and continued strain upon the circulation in the main arteries.

Symptoms.—A diastolic murmur is audible in the second right intercostal space (in the aortic area).

There is a "Bruit" which is loudest at the third left intercostal space, and is widely diffused round the apex.

As there is usually hypertrophy and dilatation of the left ventricle, the apex is found to be displaced more than in any other cardiac valvular disease.

There is the characteristic "shotty" or "Water-Hammer" pulse.

The sphygmographic tracing of the pulse will show a long percussion stroke, with a sudden down stroke, broken only by a small diastolic wave. There is alternate blush and pallor, due to the pulsation in the capillaries. This can be seen by drawing a line across the forehead.

General Symptoms.—The patient may get anginoid attacks. Anaemia is marked. There is frontal headache, faintness or giddiness, and often disturbed sleep. Cyanosis and difficulty of breathing are not so much marked as in mitral troubles.

In a case of aortic regurgitation, the compensation is effected by a tendency to dilatation of the left ventricle. This enables the ventricle to accommodate the blood that flows from the left auricle. There is also a tendency to hypertrophy of the left ventricle which materially increases the muscular strength of the walls of the ventricle (left), and thus enables it to pour out the blood flowing from the left auricle, also the portion that has been regurgitated from the said auricle, with greater force into the aorta. Thus there is much increased pressure of blood into the aorta in the beginning, but the pressure is diminished later on, by some portion of blood regurgitating into the ventricle, and thus the pressure that is left, is enough to drive the blood into the main circulatory system with normal pressure.

AORTIC STENOSIS

True constriction of the aortic orifice is not very common. But a similar obstruction may be caused by the production of vegetations on the inner surface of the valves. The vegetations are usually found in old people due to some degenerative changes in the arterial system.

Symptoms.—A very distinct thrill may be felt over the base of the heart. There is a systolic murmur audible in the second right intercostal space. The bruit is conducted to the carotid arteries. The murmur is usually harsh, sometimes musical.

The pulse tracing is sometimes anacrotic. It is small, sustained and slow, as the constriction or the growth in the orifice of the valve prevents the full effect of the contraction of the left ventricle upon the blood column in the systemic arteries.

General Symptoms.—A general disturbance of circulation appears.

The patient is markedly anaemic, the face is pale, there is faintness and giddiness, persistent dyspnoea, slow pulse and occasional anginoid attacks.

If this aortic stenosis continues for a long time, the left ventricle becomes more and more dilated, and the Mitral orifice widens. As a consequence, the valves do not completely close, and Mitral Regurgitation sets in, combined with the aortic trouble—"double aortic"—a systolic and diastolic bruit are heard. Compensation in the case of an aortic stenosis may be brought about by hypertrophy and increase of strength of the muscular structure of the left ventricle.

TREATMENT OF THE VALVULAR DISEASES OF THE HEART

In dealing with the valvular diseases of the Heart, the following principles should be attended to :—

In acute and severe cases, rest in bed is essential, so also freedom from anxiety and excitement. Sudden movements of all sorts should be forbidden. The diet should always be nutritious as well as easily digestible, as indigestion will aggravate the trouble, and make the condition of the patient worse. The amount of fluid intake should be moderate, and the largest meal should be taken at midday. The evening meal should always be before or

shortly after sunset, and should consist of a very light and easily digestible stuff. Alcohol, Tea, Coffee and Tobacco should be religiously avoided.

1. Diet.—

A special diet in a case of valvular troubles of the Heart should be four divided daily meals.

Breakfast	...	...	Orange	...	...	1.
			Apple	...	...	1.
			Almonds	...	...	10 to 20.

The best way to take the almonds is, to break the shell, keep the kernel soaked in water overnight; then peel off the red covering of the kernel, crush the pulp, make it into a very soft paste, add water 6 oz. and sugar 2 dr. and make it a thin emulsion. It is used by the Indians (especially the wrestlers) as a cooling drink.

Lunch	...	...	Soup	...	...	4 oz.
			Bread	...	...	2 oz.

Lean meat of roast chicken 4 oz. (if the heart trouble be the result of an attack of endocarditis due to rheumatic affection, no meat should be given, white fish 2 oz. may be given instead).

Afternoon tea should be 6 oz. only.

Evening	...	...	Bread	...	...	1 oz.
			Cheese	...	...	1/2 oz.
			Water	...	...	10 oz.

A piece of sweet biscuit and barley-water 12 oz. may be given instead of the bread, cheese, and water.

Medicine.—If the pulse is rapid, irregular and weak, Digitalis is indicated. But Stropanthus produces better results as it has the advantage of the good effects of Digitalis. It does not constrict the arterioles like Digitalis which is contra-indicated in Mitral Stenosis.

Temporary breathlessness in Heart disease may be dealt with by administration of Chloric Ether and Spirit Ammonia Aromaticus.

In subacute and chronic cases, the chief aim in the treatment of Heart Disease should be to improve the condition of the blood by nutritious and easily digestible diets, avoidance of Alcohol, Tea and Tobacco. The administration of a carminative mixture containing Strychnine improves the muscular structure, and thereby gives tone to the auricles and the ventricles of the Heart.

The Pulmonary congestion and the back pressure in the Systemic circulation should be relieved by an occasional administration of purgatives (Calomel followed by Saline), and diuretics.

Massage.—The patient should be given massage of the whole body with pressure (very light to moderate) in the following ways.—**Massage of the head and Neck.**—Refer to (Pages XVI...XIX. Introduction).

The Arms.—Refer to Massage of the upper extremity,—(Page XV Introduction).

The Trunk :—

(a) **The Back**—1. With pressure alone on the spine downwards and upwards,

2. With pressure downwards and upwards on either side alternately. But in the Lumber region, the pressure should be given transversely.

While massaging the back, the patient who is too weak to sit up for a long period, may have a forward lying position during the massage, better a prone position, facing an inclined plane, with the head upwards.

(b) **The Chest.**—Pressure should be given on either side of the Pectoralis Major muscle, starting from below the clavicle down to the subcostal arch and upwards alternately. Refer to Chest massage—(Introduction Pages XIX...XX).

(c) **The Abdomen.**—The patient should lie on his back. The pressure should be given with up and down movements; also circular movements—with and against the hands of a watch. The pressure should be very light, otherwise the patient will reflexly contract the abdominal muscles very hard; he will also hold

his breath by fixing the diaphragm, causing rise of blood pressure in the system, and consequently the Heart will be taxed and damaged.—Refer to Abdominal massage—(Introduction Page XXII).

(d) **The Lower Extremities.**—The Massage should be started from the groin and the buttocks down to the feet and again upwards, finishing at the starting place. One limb should be dealt with after the other. Refer to massage of the lower extremity—(Introduction Page XIII).

When massaging the extremities, the joints should be massaged with a figure of eight movements round the joint.

Massage should be given twice daily for 15 minutes every time. Oxygen inhalation should be given throughout the procedure, by holding the funnel of the Oxygen apparatus in front of the patient's nostrils.

As soon as some improvement is noticed, the masseur should start giving "Passive" movements of the whole body of the patient, imitating the following exercises during the procedure.

Exercises.—

Group I.—Patient in a sitting posture.

Exercises Nos.—48, 49, 50, 3, 45, 44, 46.

Group II.—The patient in a sitting posture.

Exercises Nos.—38, 39.

Group III.—The patient in a sitting posture.

Exercises Nos.—33, 35, 32, 32(a), 32(b).

Group IV.—Exercises Nos.—45, 46, 47, 5, 44.

(figures as usual)

Group V.—Exercises Nos.—21, 22, 23, 24.

Group VI.—Exercises Nos.—52, 52(a), 51, 53, 59.

The exercises as mentioned in Group I should be attempted for a fortnight, and then Group II should be added to the list.

Continuing this for a week, attempt Group I, II and III, together for a fortnight or so. Then add Group IV to the programme.

After the four groups practised for a month Group V may be added to the list,—after another fortnight Group VI may be included to complete the whole chart.

In cases with defective Mitral Valves, it should be noted that, the main principle is to improve the pulmonary circulation ; so the breathing exercises, especially Exercises Nos. 5, 44, 33, 35, 39, 32, 32(a), 32(b) should be encouraged. They should be very carefully performed, as in those cases the heart is already overflowed with blood. In Aortic cases again, the muscular structure of the heart is much less damaged, so resistance exercises as already mentioned, may be recommended with good results.

All the movements should be moderately slow. Time—three seconds for each movement. The number of movements should never be more than 5 for each figure.

After the passive movements, massage should be given in the way mentioned above, with inhalations of Oxygen as before for 15 to 20 minutes.

When the patient has become strong enough to walk about, without any sign of breathlessness, he may go in for the above mentioned exercises himself, starting with the minimum number of movements, and increasing them gradually.

Massage should be given after the exercise as usual for 15 to 20 minutes.

With the foregoing exercises, special care should be taken in cases of Mitral as well as Aortic troubles.

CHAPTER VI

DISEASES OF THE NERVOUS SYSTEM

As regular blood supply is necessary for the performance of all the vital and delicate functions of the Brain, slight deviation from the normal condition, gives rise to more or less serious troubles in that organ, and upsets the whole physical mechanism—causing either trivial or serious derangements (temporary or permanent) of the organ, bringing in disturbance, also upsetting the functions of the other parts and organs of the body. It kills the body at once, or the trouble gets into a chronic condition, gradually eats up the sap molecule after molecule, and brings in the final destruction.

The usual changes that take place in the brain, are due to deficient supply of blood to the brain,—“Anaemia of the brain,” or an excessive supply of blood to the same organ—“Hyperaemia” or “congestion of the brain.”

ANAEMIA OF THE BRAIN

Anaemia of the Brain (temporary).

Symptoms.—Giddiness, nausea, vomiting, also symptoms of collapse. The face is ashy pale. The pulse and the respiration become feeble.

Causes.—Usually a sudden shock.

Treatment.—The patient should at once be kept lying down, and the legs raised at a higher level for a minute or two. If this does not give relief quickly, some diffusible stimulant, *e.g.* Spt. Ammon. Aromat. or Spt. Vinum Galicii may be necessary.

People who occasionally get anaemia of the brain due to sudden nervous shock, should try to improve their nervous system by paying particular attention to nutritious and wholesome diets, also to healthy surroundings.

Exercises.—The following exercises should be religiously practised. Exercises Nos.—1, 2, 3, 4, 5, 9, 14, 15, 18, 19, 27, 29, 30, 42, 42(a), 43, 44, 63.

Acrobatic feats such as making figures on the parallel bars, etc., also defensive arts such as boxing or wrestling should be encouraged.

HYPERAEMIA OF THE BRAIN

(Congestion of the Brain.)

Causes.—1. Obstruction in the circulation (venous) from the brain due to some tight collar worn round the neck, or tumour, etc.

2. Overstrain, sustained mental work.

3. Sudden excitement, rage, etc.

4. Certain forms of Heart Disease.

5. Over-eating.

6. Abuse of Alcohol.

7. Cessation of menstruation or climacteric in women, stoppage of the occasional flow of blood in bleeding piles cases.

Symptoms.—There is feeling of heat in the head, and uneasiness. The face is turned red and the conjunctivæ injected. Over-sensitiveness and irritability of the body and mind are present. Sometimes when the congestion is severe, there is mental confusion, followed even by loss of consciousness.

Treatment.—The main principle of treatment in congestion of the brain should be to deprive the brain of its temporary extra supply of blood, and this could be done by removing the possible causes, tight collar, over-eating, abuse of alcohol, etc.

In acute or severe forms of the disease whatever might be the cause, the patient should be kept in a sitting posture on a chair, a hot foot-bath given, ice bag should be applied on the head, and kept until the congestion is relieved.

Strong Hydragogue is of much value. A dose of Calomel followed by a dose of saline usually does much good.

Exercises recommended.—(In sub-acute or Chronic Cases).

Group I.—Exercises Nos.—15, 16, 22, 25, 32, 32(a), 32(b).

Group II.—Exercises Nos.—44, 33, 34, 34(a), 35, 39 (Breathing).

NEURALGIA

Neuralgia is a special kind of pain felt in the course of a particular nerve and its branches without any morbid change in it.

Symptoms.—The pain is usually of a shooting, burning, gnawing or throbbing type with paroxysmal exacerbations, and there is always a dull aching pain between the exacerbations.

There are definite sensory (tender) spots, generally situated in places where the nerve can be pressed against some hard surface.

Destructive lesions of a sensory nerve are found causing Anaesthesia.

Irritative lesions causing hyperaesthesia, vascular dilatation, redness, oedema and various trophic changes in that area of the skin in which the sensory fibres of the affected nerve end. Sometimes herpes like vesicles may appear in small patches along the course of the affected nerve.

The general constitution is greatly affected by continuous pain and sleeplessness.

Causes.—1. Age.—Neuralgia is often found among young adults and people of middle age.

2. Sex.—It is more common in women than in men.

3. Constitution.—People with general debility suffer most.

4. Rheumatism.—People having rheumatic diathesis, often suffer from Neuralgia of a special nerve which has been directly exposed to a draught of cold air.

5. Other constitutional diseases, *e.g.*, Anaemia, Gout, Diabetes, etc., may often give rise to this complication.

6. Injury to a nerve or tissues in close proximity to the nerve.

7. Irritation caused by tumours, foreign bodies, wounds, cicatrices, also inflammatory condition of muscles, through which the nerve passes.

Reflex Causes.—Local causes of irritation are sometimes responsible for Neuralgia, *e.g.*, caries of the tooth causing trifacial Neuralgia.

General Treatment of Neuralgia.—The cause of the trouble should first of all be found out, and if possible removed. Troubles like Rheumatism, Gout or Anaemia, should be attended to with special attention, and the palliative local treatment of Neuralgia should be adopted. Iron, phosphorus, strychnine, cod liver oil are very useful, where constitutional diseases are responsible for the origin of the Neuralgia. Strychnine should not be administered when irritability of the nervous system is present. Alcohol should be religiously avoided. The local inflammation of the muscle or a scar tissue through which the nerve passes should be checked by massage.

Sometimes local inflammation of tissues in the neighbourhood of the nerve gives rise to Neuralgia of the nerve; and the inflammation spreads to the body of the nerve within the inflamed area, causing neuritis. So along with the treatment of Neuralgia, we have to treat the Neuritis. In such cases, application of local counter-irritants, fomentations and electricity are useful. Analgesic drugs such as Caffiaspirin (Aspirin with Caffine) may be administered internally with success. A saline purge should be a routine treatment in the acute stage of the disease.

Massage.—So long as there is a chronic local inflammation and much local pain, massage should be applied 5 minutes to half-an-hour twice daily on the neighbouring inflamed muscle or the scar tissue through which the nerve is passing.

Vibrations should be given along with the massage to the trunk of the nerve and the area of distribution of the affected nerve.

Surgical interference is resorted to sometimes by nerve stretching. But the result is not much encouraging.

During the sub-acute or in the chronic condition, special exercises may be practised, and massage may be given after the exercise to give general tone to the nerve and the muscles supplied by those special nerves.

NEURALGIA OF SPECIAL NERVES

Trifacial Neuralgia—(Neuralgia of the Fifth Nerve).—Among the Neuralgias of all the sensory nerves, Neuralgia of the fifth nerve is the most common, because it is much more exposed than any other nerve, and it passes with a very tortuous course through its bony passages. The skin of one entire half of the face, the mucous membrane of the conjunctivae, mouth, the nasal cavities and frontal sinuses are supplied by the sensory branches of this nerve. The trouble may affect either one or two of its branches, or the whole of the sensory division of the nerve may get involved. The severity of the pain may vary, and radiate in different directions along the course of its branches. When the first division (Supra Orbital Neuralgia) is involved,—the pain is felt in the forehead, the anterior half of the scalp, the side of the nose, and the eyelids; small tender points are also found on those affected parts. When the second division is involved—the pain is felt over the cheek between the orbits, the mouth and the *Alae nasae*. When the third division is involved—the pain extends to the temple, the ear, the parietal eminences, the lower jaw and the tongue. Tender points are found over the back part of the temple, about the zygoma in front of the ear or over the mental foramen.

If the pain is due to reflex irritation of the parts supplied by those sensory filaments, nothing very serious happens. But there may be some severe irritative lesions in the Gasserion Ganglion itself, or in the nerve in front of the Ganglion, and several trophic also vasomotor troubles are manifested. The facial muscles are seized with spasm during intense pain. Vascularity, oedema of the face, profuse lacrimation followed by sloughing of the cornea or pan-opthalmia may occur.

Causes.—In any case, the trouble is in the Gasserian Ganglion, or some local irritative or inflammatory lesion affecting the main nerve trunk (Trigeminal). Sometimes injury to other nerves distantly situated such as the Ulnar or the Occipital, may reflexly give rise to Neuralgia of the Fifth Nerve. Severe inflammatory lesion of the Trigeminal Nerve may be due to some deep-seated bone disease—Tubercular or Syphilitic.

Treatment.—As mentioned under the general treatment of Neuralgia. But in the severest form of Trigeminal Neuralgia operative measure such as removal of the Gasserian Ganglion has given satisfactory results.

CERVICO-OCCIPITAL NEURALGIA

The pain is felt over the back part of the head, along the course of distribution of the upper four cervical nerves. This Neuralgia may be experienced when there is some trouble in the teeth. It is almost always bilateral.

Treatment.—In an acute case, saline purge, salicylates in the form of Coffiaspirin are of much value. Locally, hot fomentations and massage will give much relief. If the cause be some trouble in the teeth, the teeth should be attended to. In the sub-acute condition, exercise is beneficial.

Exercises recommended.—

Group I.—Exercises Nos.—1, 2, 3, 4, 5, 6, 44, for a week.

Group II.—Exercises Nos.—7, 9, 17, 18, 19, 23, 24 plus Group I for a fortnight.

Group III.—Exercises Nos.—14 and 15 plus Groups I & II. Special stress should be put on Exercises Nos.—1, 2, 5 and 44.

BRACHIAL NEURALGIA

In Brachial Neuralgia, irritating symptoms such as numbness, aching and pricking sensations of the sensory nerves of the arm

supplied by the Brachial plexus of nerves are manifested. Occasionally, one nerve trunk such as the median, musculo-spiral, or the ulnar is affected. So the symptoms of Neuralgia are experienced along the course and distribution of the special nerve affected.

Treatment.—During the acute condition, general treatment for Neuralgia should be resorted to. For the sub-acute and chronic cases, the following exercises are recommended :—

Exercises Nos.—1, 2, 3, 4, 5, 44, 6, 9, 11, 12, 23, 32, 32(a) and 32(b).

To improve the general condition, Exercises Nos.—14 and 15 may be advised later on, and out-door sports encouraged also.

Massage.—Massage in the form of friction, kneading, pinching and vibration along the course of the nerve is recommended.

INTERCOSTAL NEURALGIA

Tender points are found near the mid-axillary line and near the spine.

Symptoms.—The severe type of Intercostal Neuralgia affects usually the elderly people accompanied by Herpes Zooster on one side of the chest. The pain usually is on one side, and often shoots down the left arm.

Causes.—It may be due to chill, or some pressure caused by the presence of a tumour on the spinal nerve.

Treatment.—In the acute stage, usual treatment for acute Neuralgia, then massage and the following exercises are useful :—

Exercises Nos.—5, 44, 7, 8, 17, 18, 19, 22, 25, 32, 32(a) and 32(b).

For general improvement Exercises Nos. 14 and 15 should be taken up later.

Massage.—Chest and Back massage recommended. Refer to Introduction pages XIX—XXII.

LUMBO-ABDOMINAL NEURALGIA

Aching and shooting pains are felt along the course of the lower dorsal nerves. Tender points are found near the spine, middle of the crest of the ilium, lower end of the rectus abdominis muscle, in the scrotum or the labium.

Treatment.—Similar as the treatment of acute cases of the other Neuralgias. But during sub-acute and chronic stages, massage and the following special exercises are recommended :—

Exercises Nos.—3, 9, 10, 10(a), 17, 18, 19, 19(a), 20, 22, 23, 25, 26, 29, 30, 30 and 31.

For general physical improvement.—Exercises Nos. 14 and 15.

MIGRAINE (SICK HEADACHE)

Causes.—1. Nervous or Gouty diathesis.

2. Hereditary Predisposition.

3. Common to females at puberty or at climacteric.

4. Want of tone in the general constitution, etc., overstrained physical or mental conditions.

5. Improper food or impure air.

6. The immediate cause of an attack is often some disturbance caused by a large meal ; indigestible food or constipation.

7. Over-straining the eyes specially when the patient has got "Error of Refraction."

Symptoms.—The headache comes on as a paroxysm, runs a distinct course, occurs at intervals, and is frequently associated with nausea and vomiting. The symptoms may be divided into two stages :—

First Stage.—Visual sensations as bright spots or dark figures before the eyes, sensation of cold feet or mental depression precede the headache. This stage may last from 5 to 30 minutes.

Second Stage.—The stage of headache of a severe type which may last from a few hours to 2 or 3 days. The headache may be limited to one spot at the outset, and gradually affect one half or sometimes the whole of the head. It gradually becomes worse. It is usually terminated by a feeling of nausea or actual vomiting; and then the headache passes away.

Treatment.—During the acute stage, if the attack is slight, a cup of strong coffee or a drive through pleasant surroundings will ward off the attack. But when the headache is severe, the patient should be asked to lie down in a dark room, with cold water douche on the head and hot water bottle to the feet. Coffiaspirin $7\frac{1}{2}$ grains tabloids one or two at a time may be taken after a cup of cold milk. The tabloids may be repeated twice or thrice every four hours. During intervals, the patient should be kept under healthy surroundings. The diet should be regulated with easily digestible food, and the constipation should be relieved. Excessive brain work should be avoided, so also mental worry. Tonics are very useful for improving the general constitution. Suitable spectacles are required to correct any "Error of Refraction."

Diet.—The diet should always be moderate and non-irritating. Spices, Alcohol, etc., should be avoided. Protein food should be limited in quantity. Too much vegetable or starchy food should also be avoided. To avoid acidity, Sodii Bicarb. should be regularly taken 2 hours after a full meal.

Exercise.—Physical exercise is imperative for improving digestion, circulation, and giving tone to the nervous system; as well as for warding off further attacks. The following exercises are recommended:—

For improvement of the general physical condition.—

Exercises Nos.—1, 2, 3, 4, 5, 44, 9 and 15.

To avoid constipation the following exercises should be practised—Exercises Nos.—10, 10(a), 17, 18, 23, 24, 42, 42(a).

During the cold weather, tepid bath with cold douching on the head after the exercise should be encouraged. During the hot weather cold bath should be taken after taking complete rest, *i.e.*, when the body has cooled down after the exercise.

Massage.—Head and neck massage gives relief during the acute stage.

Massaging the whole body after the exercise especially of the head, neck, back (especially the spine) and the abdomen is recommended.

NEURITIS

It is the inflammation of a nerve. The lesion is not functional as in Neuralgia of a nerve, but is of an organic type.

Causes.—1. Rheumatic diathesis, or Diabetes is a pre-disposing factor. In these cases sudden exposure to a chilly weather gives rise to Neuritis of the nerves exposed.

2. Injuries to the nerves such as blows.

3. Punctured or lacerated wounds, also overstretching of the limb.

4. Pressure of bones in fractures or dislocations.

5. Spasmodic contraction of a muscle or muscles through which the nerve passes.

6. Pressure from some new growths.

7. Inflammation in the neighbourhood of nerves which may be involved in the process.

8. Infective fevers, *e.g.*, Diphtheria, Influenza, Malaria, etc.

9. Poisoning by alcohol, arsenic, mercury, lead, etc.

Neuritis is usually divided into two Groups—

1. Interstitial.

2. Paranchymatous.

Interstitial Neuritis.—There is inflammation affecting mainly the connective tissues of the nerve.

Paranchymatous Neuritis.—There is inflammation in the nerve fibres themselves which leads to degeneration and ultimately to destruction of the medullary sheaths and also of the axis cylinder of the nerve.

The chief characteristic symptoms of Interstitial Neuritis.—There is irritation of the nerve fibres caused by inflammation in the Neurilemma. The first symptom that makes its appearance is that of Neuralgia, but when the inflammation spreads into the nerve fibres themselves, the characteristic symptoms of Paranchymatous Neuritis are manifested.

Symptoms of Paranchymatous Neuritis.—At first irritative symptoms make their appearance. As soon as the nerve fibres themselves are affected, degeneration of the nerve fibres and atrophy of the muscles supplied by them set in. As a result of this, paralysis of both sensory and motor nerves of the muscles affected, sets in.

Thickening and tenderness in the nerves are the common symptoms both in Paranchymatous and Interstitial Neuritis.

Loss of reflexes is also a marked symptom.

Treatment.—The cause should be removed, and efforts should be made to give perfect rest to the affected parts.

In acute cases, the diet should be very light. Saline should be administered to keep the bowels open. Diaphoretic mixture is useful. Hot fomentations should be given locally, but in Acute Traumatic cases, cold should be applied.

As the acute symptoms pass off, systematic exercise and massage, also healthy surroundings and regulation of diet should be resorted to.

SCIATICA

It is often difficult to draw a demarcation line between Neuralgia and Neuritis of the Sciatic nerve at the outset. Both Neuralgia and Neuritis of the Sciatic nerve are often considered as Sciatica.

Symptoms.—Pain is felt in the lower part of the back (sacral region). The pain spreads down the hip and back of the thigh on one side, usually down to the leg. When carefully examined, it is found that the pain is mostly located in the Sciatic nerve itself; which is not only tender on pressure, but tender thickenings are also felt on the Sciatic nerve and its branches. Above, the painful points are often marked near the posterior Iliac spine, the Ischial Tuberosity, and the Great Trochanter, and below, near the prominence of the head of the Fibula, middle of the bend of the knee on posterior aspects of the leg, inside the junction of the gastrocnemius muscle and the Tendo-Achillis, even as far down as between the inner border of the sole of the foot and tip of the inner Malleolus.

In some cases, the patient complains of pricking sensation or Paraesthesia and sometimes Hyperaesthesia in the leg and the foot.

The "Sign of Lasèque" (the Sciatic Phenomenon) elicits the diagnosis. It consists in placing the patient in a recumbent posture, and flexing the leg upon the hip joint with a straight knee and dorsally flexed foot. This process causes much pain to the patient, as this stretches the Sciatic nerve. The pain disappears when the leg is flexed upon the thigh.

Causes.—1. This trouble is much more common in females than in males and between the ages 25 and 50. It is almost unknown amongst young youths or girls.

2. The common causes of Neuritis—constitutional Rheumatic Diathesis, Infective Diseases, Poisoning by Alcohol, Arsenic, etc.

3. Excessive curvature in the Lumbar Spine causing pressure or stretching of the nerve roots.

4. Tumours, especially of the Sigmoid Flexor, or Cancer of the Rectum, obstinate constipation causing perpetual loaded rectum may cause Neuritis of the Sciatic Nerve.

5. Inflammatory processes in the abdomen, *e.g.*, Appendicitis, or extension of inflammation from Hip disease.

6. Inflammation of the posterior part of the Glutius Medius muscle or of the muscles of the lower part of the lumbar region may cause Sciatica.

Treatment.—In acute stage, rest is indicated, especially movements like bending the thigh should be avoided, as this stretches the Sciatic nerve. Fomentations should be applied, and if the pain is severe, mustard plaster may be applied to the painful point. If the cause be supposed to be some strain on some muscle, the injured muscle may be treated with light massage for few minutes twice or thrice daily. Some light vibrations may be given along the course of the nerve, this will reduce the irritability of the nerve to a certain extent.

If there is Rheumatic Diathesis present in the patient, Anti-Rheumatic medicines will also help the treatment.

In the latter stages when the trouble becomes chronic, and which very frequently happens in this disease, massage proves very efficacious in the treatment of Sciatica. For the thickening in the muscles of the sacral region, the Glutii muscles should be regularly massaged. The range of movement of the massage would be from above downwards, a bit more pressure being given to the origin of the extensor muscles of the spine at their origin in the Sacrum. Pressure should also be given sideways, starting from the middle line alternately to the right and the left sides.

Passive nerve stretchings should also be tried. The patient lying in a recumbent posture, the masseur holds the patient's heel, gripping it with one hand, the sole of the latter's foot resting on his forearm. The foot is now dorsally flexed, while slow and moderate pressure is given on the front part of the knee to keep it extended. Now the whole lower extremity should be raised gradually to flex the

hip joint. At first certain amount of pain is felt, but the procedure should be made very slowly, and the extension be made gradually ; stopping sometimes at the stage when the patient complains of much pain during the procedure. After a minute or two the movements may again be attempted. This method should be practised some half a dozen times every day.

As soon as the patient improves with passive movements and proper massage, he should be advised to go in for the following exercises. But massage and passive movements should be continued as usual after the voluntary exercises.

Exercises recommended.—

Exercises Nos.—9, 17, 18, 19, 20, 22, 23, 25, 26, 29, 31, 32, 32(a), 32(b) and 40.

Special stress should be given to Exercises Nos. 9 and 31.

BRACHIAL NEURITIS

Symptoms.—The symptoms start with a pricking sensation in the outer part of the arms with slight numbness ; sometimes cramps or twitchings are also present. Gradually sensory or motor and sometimes both types of paralysis may appear due to atrophy of one or several muscles of the arms. Tender points and thickenings of nerves may be found in the Axilla, Supra-Clavicular, or in the Anti-Cubital Fossae. Thickenings in the median nerve are felt on the inner side of the biceps tendon, on the outer side of the upper arm in the musculo-spiral nerve, and in the ulner nerve on the inner side of the Olecranon process of the Ulna.

Causes.—1. Injury or pressure on the nerves caused by an attempt to lift a heavy weight, or pull a strong spring exerciser in a certain awkward position, pulling undue strain on the muscles of the shoulder and the arm also on the nerves.

2. Inflammation extending from Cellulitis of the skin in the area supplied by the nerve.

3. Inflammation of the muscles of the shoulder and neck, caused by Rheumatism of the Trapezius muscle.

Treatment.—Rest and fomentation in the acute stage are imperative. If the cause be Cellulitis of the skin, prompt action should be taken to cure the trouble, and as soon as it is healed, massage should be started, and fomentation given regularly.

Massage should be carried on carefully along the course of the nerve of the arm.

As soon as the acute stage is over, and the irritative symptoms begin to disappear, gentle nerve massage and active movements are necessary.

Exercises recommended.—

Group I.—Exercises Nos.—3, 4, 5, 11, 12.

Group II.—Exercises—Circumduction of the shoulder (in and out).

Exercises Nos.—2, 38, 39.

Group III.—Exercises Nos.—6, 14, 15.

To start with practise Group I for a fortnight. In the second fortnight add Group II to the Exercise, and after another three weeks, add Group III to complete the whole chart.

INTERCOSTAL NEURITIS

It means inflammation in the deep muscles of the back with symptoms of Neuritis.

Causes.—1. Injury to the back muscles caused by some direct violence to the muscles, heavy strain on the muscles during some Gymnastic Exercises, or lifting some unusually heavy weights.

2. Rheumatic inflammation of the deep muscles of the back.

3. Some inflammatory changes in the posterior spinal root Ganglia, proceeding along the course of the distribution of the nerve emerging from the Ganglia.

Symptoms.—Tender points are felt on the posterior branch of the affected nerve near the spinous process, in the axillary line

where its lateral branch becomes cutaneous ; or where the inner branch becomes cutaneous in the outer edge of the Sternum in the Chest, or of the Rectus Abdominis muscle in the Abdomen. These symptoms may precede an attack of Herpes Zooster.

Treatment.—In the acute stage rest is indicated. The bowels should be kept free, and fomentation applied. If Herpes Zooster makes its appearance, local treatment of Herpes should be resorted to. Internally Quinine and Aspirin are very useful.

Massage should be given to the deep muscles of the back twice daily.

In the sub-acute stage, massage along the course of the nerve especially at the tender points should be given with light pressure. Pinching as well as vibrations are very useful.

Exercises recommended.—Exercises Nos.—5, 44, 7, 8, 9, 17, 19, 19(a), 20, 25, 22, 32, 32(a) and 32(b).

OCCIPITAL NEURITIS.

Symptoms.—1. There is marked stiffness of the neck due to pain in the joints of the cervical spine. There is also a sort of creaking felt during movements.

2. Persistent headache confined to the nape of the neck, and Neuralgic pain is felt round the eyes. Sometimes the pain involves the whole of the scalp, and it gets worse when the patient is exposed to a draught. During the acute stage, along with the painful headache, sometimes pallor of the face and dilatation of the pupils appear due to irritation of the sympathetic nerves in the neck. But in some severe cases due to paralysis of the local sympathetic nerves, the face becomes flushed, and the pupils get contracted.

3. In sub-acute and chronic cases, tender thickenings are felt in the muscles of the nape of the neck, especially in the upper part of the Trapezius muscle.

Causes.—People having Rheumatic Diathesis are liable to this trouble when exposed to a draught. Strenuous exercises sometimes cause inflammation of the muscles of the neck, and the inflammation may extend to the supplying nerves. Rheumatic subjects are generally affected in this way. In otherwise healthy subjects, this inflammation of the muscle usually subsides without affecting the supplying nerves.

Treatment.—Fomentation and Massage—During the acute stage, the usual treatment of Neuritis such as rest and fomentations are imperative. Light massage should be started early on the muscles. (Refer Neck Massage, Introduction page xviii). As soon as the sub-acute stage is reached, vigorous massage of the Trapezius and the muscles of the neck and the throat muscles should be done regularly twice daily, together with moderate pressure on the Occipital nerves and the branches of the Trigeminal nerve on the face. Passive movements should be carried on by the masseur, such as slowly twisting the head right and left, lifting the head, pushing it backwards and forwards alternately, bending the head sideways right and left, also circular movements of the head.

After carrying on this sort of passive movements for about a fortnight, allow the patient to perform the above-mentioned movements in an active form.

The following exercises are recommended.

Exercises Nos.—1, 2, 5, 6, 18, 38.

Along with the above exercises, the following exercises should be undertaken for the general physical improvement.

Exercises Nos.—9, 14 and 15.

LESION OF SOME SPECIAL CRANIAL NERVES

LESION OF THE FACIAL NERVE

FACIAL CRAMP

Symptoms.—The onset and the course are very slow. There are spasmodic twitchings of the facial muscles generally on one side of the face. The spasm is aggravated by emotions, and sometimes it becomes continuous.

Causes.—1. Irritation of the facial nerve caused by inflammatory conditions of the local muscles.

2. Pressure caused by an Aneurism, Tumour or Cicatrix, etc.

3. Hereditary predisposition to nervous diseases.

4. Hysteria.

Treatment.—Massage should be given to the facial muscles also along the course of the facial nerves; careful and moderate pressure should be applied on the nerve.

Exercises of the facial muscles as described under treatment of facial Paralysis are recommended.

FACIAL PARALYSIS

Symptoms.—In a typical case of facial palsy, the muscles of the affected side are more or less paralysed. The patient cannot wrinkle his forehead when he wants to raise the eyelids, or frown. The eyes cannot be closed together completely. On the affected side, the eye remains partially closed. When asked to close his eyes, the patient with some effort brings the lids nearly together, and then rolls the eyeballs under the upper lid, so the sclerotic of the eye can only be seen.

On the affected side, the Naso-labial furrow is more or less obliterated; this is noticed when the patient laughs or shows his teeth. When asked to whistle, the patient cannot put both the upper and lower lips together, the air escaping irregularly on the paralysed side.

The Buccinator muscle is paralysed, so the food collects between the cheek and the gums.

The patient cannot sniff on the affected side. The nostril on the unaffected side dilates, while the ala on the affected side does not respond.

Causes.—1. Patients having Rheumatic Diathesis are predisposed to facial palsy. It occurs while the other parts of the body remaining covered, one side of the face is continuously exposed to a chill blast, e.g., when travelling in a train, and exposing the face to the chilly wind.

2. Inflammation of the middle ear or suppuration of the mastoid cells.

3. Inflammation caused by blows on the region of the parotid gland or by cellulitis of that part.

4. Tumours or Gummatous growth at the base of the brain.

5. Cerebral haemorrhage or Meningitis.

6. Double Facial Paralysis may be caused by Otitis Media or Syphilitic affection of the facial nerves on both sides (right and left) or occasionally influenza.

Prognosis.—The Rheumatic type of facial paralysis in which facial Neuritis is the chief cause, develops very quickly. It usually subsides in the course of 2 to 3 weeks. The patient may not completely recover. In that case there is left a contracture of the paralysed muscle. When the patient tries to speak, or to shut his eyes, it is observed, that on the paralysed side the muscles that seem to be slightly contracted, remain in that condition unchanged. But the muscles of the sound side show a wider range of movement.

Treatment.—In cases where a tumour is the cause, it should be removed by surgical operation, provided the tumour is accessible.

In Syphilitic cases, Anti-Syphilitic treatment is the first step that should be taken. After a full course of Anti-Syphilitic injections, massage and other procedures should be adopted.

In the acute stage of an ordinary Rheumatic type of facial paralysis, local fomentations to the nerve should be applied. Salicylates in the form of Caffi-aspirin are very useful. In the sub-acute and the chronic cases, massage to the muscles and along

the course of the facial nerve, from the Sternomastoid Foramen to the different distribution of its branches should be given. After such treatment for a fortnight, voluntary exercises should be resorted to.

Exercises.—Sitting before a mirror the following expressions should be tried twice daily :

- (a) Laughing.
- (b) Crying.
- (c) Frowning.

The above expressions should be practised 3 to 50 times each.

Regular massage should be given along the course of the nerve after the exercise.

For all-round physical development and general tone of the system, the following exercises should be practised :—

Exercises Nos.—1, 2, 3, 6, 9, 14, 15, 18 and 19.

SPASMS

1. Continuous spasms of a muscle	...	Tonic Spasm.
2. Intermittent spasm	...	Tremor.
3. Small jerky spasm	...	Clonic Spasm.
4. Violent muscular movements with loss of consciousness	...	Convulsion.

(2) **Tonic Spasm.**—It is due to some irritative lesion in some part of the motor tract, or some pathological irritation in the muscle itself.

Tonic Spasm occurs in the following conditions :—

- 1. Cramp.
- 2. Occupation Cramp.
- 3. Hysterical Cramp.
- 4. Hysteria.
- 5. Paralytic Rigidity.
- 6. Tetanus.
- 7. Tetany.
- 8. Arthritic Rigidity.
- 9. Thomson's Disease,

CRAMP

It is a tonic muscular spasm affecting one or more muscles of the limbs.

Causes.—It may be seen in people apparently in good health.

In ordinary life, it is commonly seen to trouble the patient at night. People who are thus affected, are usually of a Rheumatic Diathesis.

It is usually found to come on people after prolonged swimming, long continued walking or running, etc., which exhausts the muscles.

In some people, it is found when he lies with a limb in a straight position.

In periphery Neuritis, Cramp is a frequent predominant symptom.

It is due to irritation in some part of the motor path from the brain or may be due to direct irritation of the muscle.

Treatment.—Relief should be given at once to the muscle which is affected, by working on the antagonistic muscle, *i.e.*, when the flexor muscles of the forearm are affected by cramp, the extensor muscles of the forearm should at once be put into action, thereby giving relief to the flexors. Also massage should be given to the affected muscles, after the mechanical relaxation of those muscles.

Exercises for an all-round improvement of the body should be taken.

Exercises recommended.—

Exercises Nos.—1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 13, 42, 42(a), 54, 52, 52(a) and 52(b).

OCCUPATION CRAMP

It occurs in people having some special form of professional work, as in the case of writers, piano or violin players, telegraph operators, etc., in whom the same repeated action of certain muscles or groups of muscles is necessary.

The following symptoms are manifested in these cases :—

1. Tonic Spasm.
2. Pain.
3. Tremor.
4. Atrophy.

Writers' Cramp.—It is much frequent in nervous and sensitive people especially of low vitality and malnutrition, or suffering from fear, grief or anxiety. Members of a family with Neurotic heredity are usually subject to this disease.

Course & Symptoms.—After writing for some time, the fingers get stiff, and the patient fails in the attempt to write any further. The spasm he gets is sometimes very painful. There comes a change in the handwriting, the quality of which deteriorates gradually, and in the course of a month or so, Tonic Spasm is caused in the muscles (used in writing) when the patient makes the slightest effort to write. In later stages the spasm starts spontaneously,

The grasping power of the muscles of the hands is not much affected.

In some cases actual pain is felt when the spasm is on, there is tenderness of the nerve trunks, and tender points are felt along the course of the nerve. Certain amount of atrophy of the interossei muscles (of the palm) is also observed.

Treatment.—In patients with a weak constitution, general hygienic treatment does good. Nervine tonics are not of much benefit. For Neuralgic pain sedatives may be administered. Cod Liver oil is useful.

As regards active treatment, in the acute stage, to refrain from writing with the affected hand is absolutely necessary. In the

meantime, the patient may be advised to attempt writing with the other (left) hand. After rest for some six weeks or two months, the patient may be advised to attempt writing with his affected hand more freely and larger letters by holding the pen loosely and in a different way.

If there is any inflammation in the muscles of the hand, forearm, upper arm or the shoulder, it should be carefully treated with regular massage.

Nerve massage should be adopted. Massage should be given regularly twice daily to the Brachial plexus, and to the Median, Radial and Ulnar nerves individually.

Proper and systematic exercise of the arm, forearm and the hand is extremely necessary. But special care should be taken so that the patient never gets exhausted with the exercise.

Exercises recommended.—

Exercises Nos.—3, 4, 5, 6, 44, 6, 7, 11, 12, 47, 47(a), 48, 49, 50, 67 and 68.

For general physical improvement Exercises Nos.—14, 9, 15, 1 and 2.

CRAMP OF THE CALF MUSCLES

Symptoms.—Painful Tonic spasms of the Calf muscles experienced by patients mostly at night and during sleep. All on a sudden the patient wakes up with a severe cramp in the calf muscles, the muscles getting hard and tender.

Varicose veins become prominent in the legs of people suffering from cramps in the calf muscles.

The calf muscles become tender even when they are not contracted. They are tender especially on pressure.

Causes.—1. People with Rheumatic Diathesis often suffer from cramps of the Calf muscles.

2. Sudden fatigue of the calf muscles caused by most strenuous exertions such as running, dancing, hill climbing, etc.

3. Voluntary movement of the foot to place it in a certain peculiar position, and thereby causing both the origin and insertion of the muscles to be brought close to each other.

4. Varicose veins, intra-muscular and often superficial to the calf muscles.

Treatment.—During acute cramps of the calf muscles, the patient should be asked to lift his leg stretching the knee-joint, and point the toe upwards. If the patient is weak and flabby, also the leg is too heavy, some body should help him in the operation by placing his (attendant's) left hand under the popliteal space (back of the knee-joint), holding the great toe with the right, (if he is standing on the right side of the patient), lifting the leg, and keeping the leg stretched at its full length. Remove the support that has been given by the left hand behind the popliteal space, and ask the patient to keep his lower extremity stretched as before and raised above the ground. While dealing with the left leg, the attendant should stand on the left side of the patient, and employ his left hand to hold the great toe and the right to support the knee joint. The whole procedure should be done very smartly, and the great toe should be kept pressed upwards towards the knee-joint. So the tibialis and the peroneus muscles (antagonistic to the calf muscles) being contracted, the calf muscles get relaxed, and the cramp passes off. Light massage should be given at the same time to the calf muscles.

Regular massage twice daily should be given to the calf muscles. The pressure should always be from the periphery towards the heart.

If any thrombus is noticed at a certain part of the leg, it should be kept at rest, and treatment of thrombosis should be resorted to.

Active treatment.—When walking, elastic stockings for the varicose veins should be used, and during sleep, the legs should be bandaged. The bandages should be tied from below upwards, Starting from the ankle, it should be finished at the head of the fibula.

Exercises recommended :—

Group I.—Exercises Nos.—13, 15, 16.

Group II.—Exercise.—Position.—The patient lying flat on his back, on a bench (having the legs of the bench towards the foot raised a little, making its inner angle some 60° with the ground. Both the legs of the patient from the knee-joint down to the foot should be kept beyond the lower margin of the bench.

Exercise.—

- (a) Contraction of the flexor muscles of the leg.
- (b) Contraction of the Extensor muscles of the leg.
- (c) Leg rolling right circle—with the hands of a watch.
- (d) Leg rolling left circle—against the hands of a watch.

Group III.—Running, Cycling and Hill climbing should be practised later. The speed should at first be slow, and then gradually increased.

Massage.—Massage should be applied carefully and regularly with moderate pressure, after the exercise. The patient should lie on his back on the inclined bench as before, and elastic bandages be worn afterwards.

NEURASTHENIA AND OTHER ALLIED DISORDERS

Sexual repression leading to increase of sexual tension is supposed to be responsible for this disorder, as enunciated by Professor Freud. Several symptoms of physical and mental inefficiency, along with various subjective sensations and vaso-motor troubles are manifested ; but no definite organic disease could be counted to be the cause of this trouble.

Both male and female also people of any age may suffer from this disorder.

Predisposition, hereditary or acquired such as depression of the body and mind after Influenza, Typhoid etc., also Chronic Dyspepsia often enhance Neurasthenia,

Mental over-strain and sudden shock are found to be the most common predisposing causes responsible for Neurasthenia in subjects already depressed physically and mentally.

Chronic emotions such as sorrow, business speculations, worry and anxiety usually predispose Neurasthenia in apparently healthy subjects.

Railway and other accidents, may occasionally develop Neurasthenia in certain cases, some time later.

Abuse of Alcohol or other intoxicants, is also responsible for Neurasthenia in many cases.

Symptoms.—A sense of fatigue and general weakness is often experienced. A feeling of nervousness is the most common symptom in a Neurasthenia patient. The mental weakness is more marked than physical. The symptoms may be divided into four groups :—

1. Gastro-Intestinal.
2. Spinal.
3. Vasomotor and Sympathetic.
4. Cerebral.

1. **Gastro-Intestinal Symptoms.**—In these, the Gastric symptoms are most often complained by the patient in an exaggerated manner. The morbid anatomy is not very serious in these cases. Slight and occasional gastric troubles give rise to regular Neurasthenia in these people.

2. **Spinal Symptoms.**—There are restlessness, sometimes jerking of limbs, vague pains in the back and the extremities, sometimes Neuralgic pains and localised tenderness, or hyper-sensitiveness of the whole body. Muscular tremors are occasionally present. Knee-jerk is always present in these cases. In some cases, there are frequent nocturnal emissions and sexual disability.

3. **Vaso-motor & Sympathetic Symptoms.**—Disturbance in the Vasomotor and Sympathetic Systems are indicated by faint, giddiness or palpitation without any cause, also by cold hands and feet. Sometimes, there is clutching followed by shivering.

4. **Cerebral Symptoms.**—The patient gets upset very easily, without any serious cause. He is afraid of getting into a crowd,



Mr. Kanai Lall Paul.

To Major P. K. Gupta

My dear Sir,

The Photo of mine which I have enclosed herewith, will show my present physical condition I have acquired under your careful physical culture treatment that has cured my Neurosis and chronic stomach troubles. I must say that nothing on earth except your excellent method of treatment would have saved me from that undermined condition of body and mind from which I suffered for a long time,

With kind regards.

Calcutta)
21st December 1935 }

Yours affectionately,
Sd. KANAI LALL PAUL,

(Facing page 148)

He often indulges in false and anxious imaginings. Standing on a railway platform he thinks that the train is coming over him. He is afraid of going out alone in an open space or in the streets, fearing that his heart will fail when left in the street alone. He is afraid of being in a society.

The patient usually becomes sleepless and restless. Some patients get irritable with a slight provocation, others gloomy and melancholy keeping their troubles in themselves, and seek relief by committing suicide.

Prognosis.—It is a chronic malady, it makes the patient's as well as his friend's life miserable. It never becomes fatal unless the patient commits suicide. It is amenable to psychological and physical treatment rather than medical.

Treatment.—When the patient manifests irritable symptoms, and becomes sleepless, the best treatment would be to give him rest and a little medicine for soothing his nervous system. Bromides may be much useful in such cases.

Alcohol or other intoxicants should be altogether avoided.

Neurasthenia with gastric symptoms could be cured by carminative mixtures and regular physical exercise. In these cases the following exercises should be specially prescribed :—

Exercises Nos.—9, 10, 10(a), 23, 24, 26, 29 and later on 27 and 28.

For general strengthening of the body, the following exercises should be adopted :—

Exercises Nos.—14, 15, 18, 19 and 19(a).

Cases in which the general weakness of the body is the chief symptom, nerve tonics are useful. But unless proper physical exercise and regulation of diet are arranged for, the patient seldom gets the proper benefit. In these cases, the exercise to start with should be very easy ; and care should be taken not to allow the patient getting fatigued,

To start with, the following exercises should be attempted :—

Exercises Nos.—1, 2, 3, 4, 5, 44, 9, 15, 16, 19, 19(a) and 20—followed by outdoor walking for some time in parks or the river-side. In those cases in which constipation may be the cause, the trouble should be remedied by practising the following exercises :—

Exercises Nos.—26, 9, 10, 10(a), 29, 27 very carefully.

Cases in which pain, paraesthesia and tenderness in the back are the prominent symptoms—light massage on the back, followed by the following exercises will do a lot of good.

Exercises Nos.—9, 1, 17, 18, 19, 19(a), 20, 22, 24, 25 and later on 14 and 15.

Vigorous massage and Turkish Bath should follow these exercises.

Cases in which the patient is irritable, the following exercises will be useful to a great extent.—

Exercises Nos.—29, 30, 31, 32, 32(a), 32(b), 33, 34, 34(a), 35, 39, 22, 17, 18, 9, 3, 5, 44, 14 and 15.

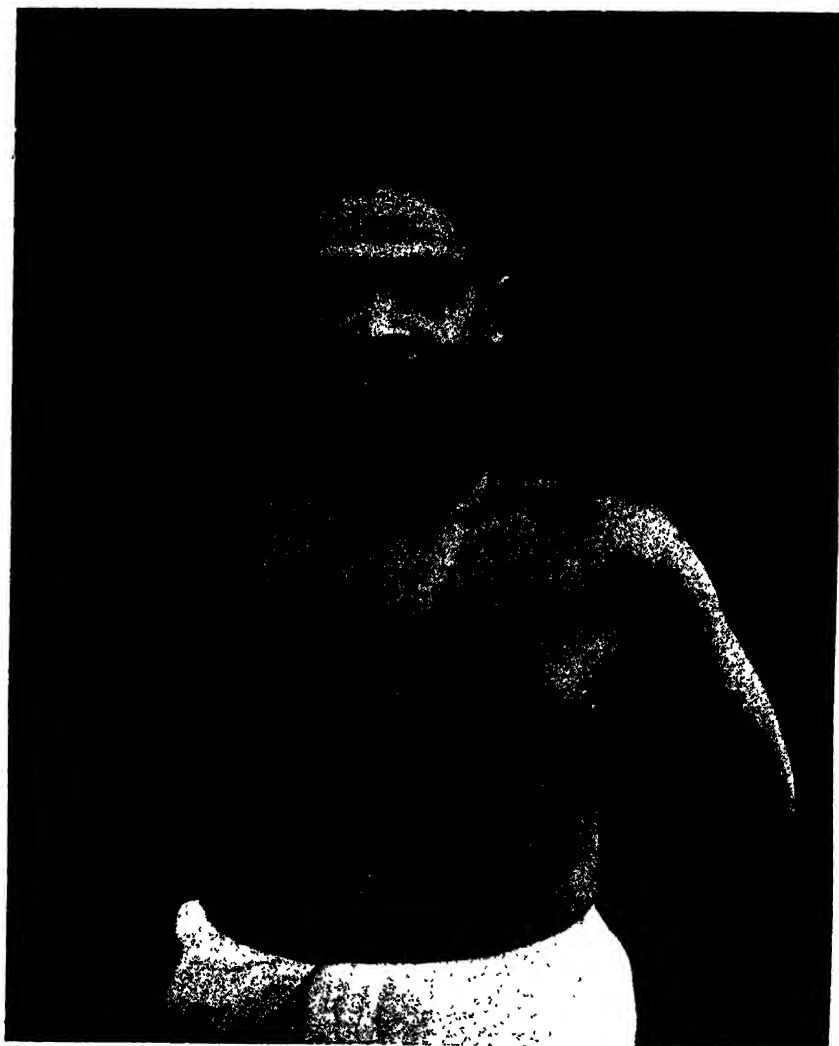
Massage of the spine from above downwards after these exercises is very important.

Melancholic cases should be dealt with very carefully. These patients take a very long time to recover. Treatment by suggestions is an important procedure in such cases. The patient should be told that there is nothing in him as he himself thinks it to be. He should be advised not to brood over his symptoms, and to try to divert his mind in various kinds of sports and games ; and also encourage healthy associations. Suggestive treatment and the following exercises are recommended for this purpose :—

Exercises.—

Group I.—Exercises Nos.—3, 4, 5, 44, 9, 22, 26, 32, 32(a), 32(b), 33, 34, 34(a), 35 (for about three weeks).

Group II.—Exercises Nos.—1, 14, 15, 18, 19 in addition to Group I should be continued.



Mr. Nalini Mohon Mukherjee.

Dear Major Gupta,
 My hearty thanks for your special
 physical culture treatment which cured me
 of my neurasthenia, the disease which made
 my life miserable for almost a decade.
 Yours sincerely,
 Nalini Mohon Mukherjee
 Calcutta
 The 25th January 1934

HYSTERIA

It is a disorder of the nervous system which creates a sort of instability of all the emotional, sympathetic and vasomotor reflex conditions, causing various functional disturbances manifested throughout the life of the patient, such as spasm, general convulsion, paralysis, numbness, tenderness of certain spots, flushes, palpitations, retention of urine, etc. These symptoms occur from time to time in the same person. The disorder resembles almost always several organic diseases of the nervous system with varying deviations. It never turns to be fatal, though very obstinate, and is curable if the case is properly and carefully handled.

Causes.—Predisposition hereditary or acquired, has an important influence in the causation of Hysteria in a subject. (a) Hereditary :—Children of hysterical patients, insanes or habitual drunkards, commonly suffer from hysteria. (b) Acquired :—One of the acquired predispositions to hysteria is perverted education, *e.g.*, allowing the child to yield to every emotional impulse. Unwholesome reading causing its imaginations to become abnormally excited.

2. Protracted illness causing general weakening of the body and mind really fosters the evolution of the diathesis.

Hysteria is mostly found among the female sex, but occasionally men are also found to be subject to this disease.

Amongst the determining causes are the physical and mental disturbances—Frequently those emotional, business or domestic anxieties, such as domestic quarrel or loss of a relative, also disappointment in love are the most common.

Symptoms.—The Hysterical patient usually shows a disposition of unstable equilibrium of the emotional and other faculties of the mind. Occasionally they are easily roused to convulsive movements, impulsive actions or hasty judgment. They give way very readily to joy or grief, and have very little control over flow of tears or outburst of laughter. They want sympathy from all around

them, and try to exaggerate the symptoms to arouse sympathy in the minds of their friends and relatives, also the physician, in order to show that they are seriously ill.

There is observed an increased acuteness of intolerance of light and sound. The patient complains of tenderness in the region of the stomach or on the head. Sometimes pressure on these parts may cause convulsive fits.

The patient complains of a sensation as of a ball in the throat (*Globus Hystericus*) or a feeling of suffocation which is relieved after profuse windy eructations.

Sometimes there is flushing in the face or other parts of the body, without any sufficient provocation. There may be pallor.

Treatment.—Both the physical and mental predispositions in the patient should be dealt with very carefully. As regards the the mental aspect of the treatment, the patient should never be told that he is suffering from Hysteria. Attempts should be made to convince him that there is nothing serious in him.

The patient should be given training for self control. He or she should not be asked too often about the symptoms, as that may give rise to its outbreak. He should be fairly encouraged, and given some special tasks to perform, so that his attention will be kept diverted.

If the patient is delicate or devitalised after some protracted illness, the first attempt should be to improve his general health. Exercises should be advised, and especially those that the patient will like to perform, should be prescribed. But when prescribing, the teacher must have some will-force to impart into the patient's mind, and convince him that those especially selected exercises will be quite suitable to him

Special groups of exercises should be prescribed for special types of symptoms.

If the symptoms point towards Gastro-Intestinal disorders, Exercises Nos.—9, 10, 10, 10(a), 17, 18, 19, 22, 23, 24, should be

prescribed. Shaking the pit of the stomach, also the hepatic region in the early morning should also be advised.

If paralysis of the voluntary muscles be the chief symptom, the following steps should be taken :—

The antagonistic muscles of those special muscles that are affected, should be given passive movements, and the patient should be asked to give resistance to those movements, and practise accordingly.

If there be spasm of the involuntary muscles causing phantom tumours, dysphagia, etc., local massage is of great value.

CHOREA

This disease is characterised by irregular and awkward movements of the limbs.

Causes.—1. It is about 75% more frequent in the female than in the male.

2. It is a disease of childhood between the ages 5 and 15, and is common amongst the poorer people.

3. It is common among children having a hereditary tendency to nervous troubles.

4. Acute Rheumatism, quinsy or some infectious disorders such as Measles, etc., may be the precursors to Chorea.

5. Fright or mental shock.

6. Injury.

7. Emotion.

8. Early tendency to imitate, although it is a comparatively rare cause.

9. Pregnancy in adult females is a common antecedent.

Symptoms.—The common symptoms of the disease are involuntary movements of a jerky, irregular or twitching character, and are aimless ; appearing mostly in the muscles of the face and the arms. The movements of the lower extremities are often less

frequent. But the movements of the trunk muscles which accompany those of the upper extremities, cause a sort of rotatory movement of the body to one or the other side. Sudden retraction of the abdominal muscles and jerky action of respiratory muscles are also observed.

There is some degree of ataxy or inco-ordination which is more marked in voluntary movements. If the hands are stretched out in front, the patient is quite unable to hold them, he cannot pick up small objects. After grasping an object, one or two fingers yield very quickly, and the hand also the arm drop. If the patient is watched while performing some work, or if he gets excited, the movements will increase. When attempted, the tongue is put out with a jerk. When walking, the legs are thrown about, the trunk is rotated with a jerk, and the shoulder is lifted.

The patient talks with a monotonous and low pitched voice. The speech is irregular.

Sensation is not much impaired. The patient may look idiotic which really he may not be. This may be due to the peculiar and purposeless contraction of his face. He may be weak in memory. In severe cases maniacal symptoms may develop.

There is a tendency to valvular disease of the heart.

The digestion is impaired, and constipation is present.

General muscular weakness is present.

The duration is very variable. It may last for several months, and may recur.

Morbid Anatomy.—In the naked eye, nothing is marked in the nervous system of a Chorea patient after death. But some minute veins in the brain are found to be obstructed if seen under the microscope, and small softening also degeneration of nerve cells may be observed. Signs of endocarditis are very commonly noticed after death of Chorea patients.

Treatment.—The patient should be kept quiet in bed free from worry. None should annoy or ridicule him. He should not be given much lessons to perform. In patients with severe symptoms,

soporific and anti-rheumatic medicines should be administered in the incipient stage. Among medicines, Chloral is widely used as a soporific. Aspirin is of great value as an anti-rheumatic agent. Liquor Arsenicalis also does good. In violent cases, the patient can be guarded against from injury by padded boards at the sides of his bed.

In the ordinary type of cases, or in cases where recovery is in sight, massage and suitable also regulated exercise are of great value.

The movements should be careful, slow and bilateral. Timing and symmetry should be observed very strictly.

Exercise.—To start with, very simple movements of one muscle or groups of muscles should be attempted, and the following exercises are recommended.

Group I.—Exercises Nos.—3, 4, 5, 44, 1, 2, 6, 9 and 13.

The patient should be asked to perform the exercises before a mirror, so that he can try to exercise his brain's control over the muscles. The movements should be careful, slow and bilateral.

Group II.—Exercises Nos.—11, 12 and 50 (alternately and simultaneously).

Group III.—Exercise —Pronate and Supinate the forearm, keeping the fist intact—

- (a) alternately,
- (b) simultaneously.

Group IV.—Exercise No. 49—After making a fist as before, move the wrist in the form of circumductions with, and against the hands of a watch.

- (a) alternately,
- (b) simultaneously.

To improve co-ordination some special exercises with complicated movements are necessary.

Group V.—Sitting on a chair, the patient should attempt to carry his hands alternately and simultaneously to the nose,

forehead, chin, the ears and back of the neck. For the movements of the face which require will-power or control on the special muscle or groups of muscles, the following movements should be attempted :

1. Wrinkling the forehead.
2. Frowning.
3. Screwing up the mouth.
4. Smiling.

Quick movements should not be allowed to perform, until the patient has improved under exercise treatment, and attained certain amount of marked improvement in co-ordination. Later on resistance exercises should be allowed, and close attention should be paid to a special muscle or groups of muscles.

PARALYSIS AGITANS (Shaking Palsy)

The disease is characterised by tremors of the hands and arms associated with weakness and rigidity of the muscles.

Causes.—It seldom manifests before the 40th year of life. Men are much more susceptible than women. There is hereditary predisposition, but fright, emotion, exposure to cold, and trauma, may be the determining causes in many cases.

Symptoms.—The onset is very slow. There are three important points to observe :

1. Tremor.
2. Rigidity.
3. In some cases tremor is the first symptom, and in others rigidity comes on first, but in the long run, both the symptoms are found to be present.

1. **Tremor.**—Which is moderate in intensity and extent, usually begins in the right hand ; the fingers are gradually flexed with the thumb resting on the forefinger, making movements similar to the rolling of pills. The tremor is continual, and increases with emotion. The head and the neck are excepted. The tremor, after it has existed

for some time in one area, usually spreads to the leg on the same side, and then starts to the hand on the opposite side, and then extends to the leg of that side. The trunk is not commonly affected. There is slight movement of the head.

2. Rigidity.—The muscles gradually become stiff, and the patient acquires a peculiar attitude. The head appears to be fixed, and is bent slightly forwards. When walking, the patient shows a tendency to fall forward. The elbows attain a flexed position almost at a right angle, and away from the side. The legs also are slightly bent due to rigidity. There is always a feeling of rigidity to start a movement, but when once the movement is started, it becomes quicker and quicker, the patient goes forwards without a stop, and has a tendency to fall; and unless checked, he ultimately falls to the ground. Again, some patients when gently pushed backwards are unable to stop themselves; they continue to go backwards without any halt until they are checked, or fall down.

The face looks expressionless, with the eyes always looking forwards. There is progressive weakness. As the disease advances, it gets chronic in character. It may take 2 or 3 years before another limb gets affected, after the trouble has been manifested in one. Gradually, the whole body may be involved. The speech gets monotonous and slow. Several subjective symptoms such as restlessness and continuous desire to move when in bed, dull aching pain, sense of fatigue, also feeling of great heat with free perspiration make their appearance.

Treatment.—The patient should be kept free from any business worry. Many sedative drugs are of some benefit specially Hyoscine Hydrobrom. Arsenic does some constitutional improvement. Continuous galvanic current does some good.

Exercise and massage do a lot of improvement in these cases—Massage in the form of light stroking of the stiffened muscles, also slow and light kneading of those muscles are effective in relieving the stiffness in them. Nerve pressure should not be given,

Passive movements are useful, the flexor muscles should be stretched for some time, and this will also relieve the stiffness.

After giving passive movements for 3 weeks, the patient should be encouraged to perform some very light and easy exercises before a mirror, as this will improve the condition of the nerves and increase the patient's brain control over the muscles.

Exercises recommended.—

Sit on a chair, and also looking into a mirror, attempt the following exercises :—

Group I.—Exercises Nos.—1, 2, 3, 4, 5 with only light free movements.

Then sit on an easy chair, and the masseur will gently knead the muscles and give a few light strokes on the muscles exercised.

Group II.—Exercises Nos.—21, 22, 23 and 25.

Sit on an easy chair, and the masseur will give light massage as after group I.

Group III.—Exercises Nos.—26, 42, 42(a), 31 and 31(a).

The masseur will give massage to those muscles that have been used during the above exercises.

The Physical Instructor should help the patient to perform the figures by passive movements for all the three groups of exercises, before he could do them voluntarily. Then after some time, the subject should be made to perform those movements with his own efforts.

CEREBRAL HÆMORRHAGE

(Apoplexy)

This disorder consists in minute or even profuse hæmorrhage (several ounces) in the brain or its membranes.

Causes.—It is more common in men than in women, and also in people of advanced age than in young or the youthful. In a person under 40 years of age, it is due mostly to embolism or thrombosis. Heredity may be counted to be one of the causes,

as with this the subject develops a predisposition to Apoplexy due to premature sclerosis of the arteries, which is a natural predisposition prevalent in some families. High arterial tension is as a matter of fact, the main cause of cerebral hæmorrhage. Alcohol, Gout, and Syphilis are also the causes of Apoplexy, as they cause arterial sclerosis in persons already suffering from those troubles one or the other.

When there is high blood-pressure in the system, the arteries of the brain which are sclerosed, *i.e.*, have lost their proper amount of elasticity, cannot stand the strain due to the tension caused by the pressure, and they burst. Again, the Cerebral arteries burst much more easily, because in the brain substance or in the meninges, the arteries or the arterioles are not well supported, as the surrounding brain tissues are very soft in consistency ; while the arteries in other parts of the body are much better supported by muscular or fibrous tissues on all sides.

Morbid Changes.—The hæmorrhage may be very minute in quantity, or it may be several ounces. The effused blood acts as a foreign body in the brain. If the quantity effused is very great, the pressure caused by it, tears through the soft cerebral tissues, destroying several important structures such as the internal capsule, centrum ovale, and the optic thalamus, it causes blockage, and by cutting off the blood supply of those important structures of the brain, makes the case end fatally sooner or later, according to the quantity of blood effused and the amount of pressure caused by the blockage. In post mortem examination, signs of pressure on the brain substance by the blood clots are marked, and softening of the brain substance is manifested. If the patient survives, the effused blood clots get absorbed, and in course of time, a cyst or a tough fibrous scar is left at the site of the old effusion.

Symptoms.—The hæmorrhage may be coming on abruptly or slowly. When abruptly, the symptoms vary from slight giddiness to complete unconsciousness. If this hæmorrhage takes place in an unimportant (*i.e.*, not an important centre) part of the brain, there

may be slight giddiness, spasm of muscle, or there may be no symptoms at all manifested. But if the haemorrhage takes place quickly, and in a very large quantity, an attack of Apoplexy is manifested at once. Where high arterial tension is the chief cause, a warning (prodromal stage) is often given in the form of headache, giddiness and insomnia. The patient may become unconscious with or without convulsion; paralysis may set in at once or very slowly. It all depends upon the quantity of the blood that is effused, and the rapidity or the slowness of the effusion. Very seldom the patient falls down unconscious. The symptoms usually come on slowly. The patient complains of an intense pain in the head, then he falls into a swoon, becomes convulsive more or less, and then gets into a sort of coma. There is stertorous breathing, cyanosis of the face and slow but full bounding pulse present.

After the patient has recovered from the attack (the stroke), the following symptoms make their appearance.

The paralysis of one side of the body (Hemiplegia) due to the pressure of the haemorrhage on the substance of the brain and on the surrounding tissues, sets in. If the haemorrhage is very small and limited, paralysis of one hand or an arm or leg follows. But if it be very minute, definite paralysis may not be observed at all.

Hemiplegia caused by the stroke is almost always on the opposite side, *i.e.*, if the haemorrhage be on the right side of the brain, the paralysis that follows will be on the left side of the body.

Treatment.—The patient attacked with Apoplexy should not as a rule be removed from the place where the seizure has taken place. He should be placed on a mattress spread on the floor. The body should be kept in a recumbent position, with the face turned gently to one side, to prevent the tongue falling back into the pharynx, and thereby causing difficulty of breathing. An ice-bag should be placed on the head, a few grains of calomel may be put on the back part of the tongue, and after some time, an enema should be given. If the pulse is full and bounding, venesection may be performed, drawing out 2

to 10 ounces of blood. The bladder may be emptied by a catheter if it is full of urine. When the patient regains consciousness, he should have perfect rest in bed, and the bowels regularly attended to. The diet should be milk for a few days, and this should be given in a very small quantity.

As soon as all the signs of active mischief in the brain have subsided, massage and passive movements should be carefully started, as delay might cause stiffness of joints. No active exercise should be prescribed before 3 or 4 weeks after the stroke. The exercises should be moderate and light to avoid any further attack, as severe and strenuous exercises may cause the old trouble (haemorrhage) to appear again.

HEMIPLEGIA

It is a paralysis of one side of the body due to some lesion in the internal capsule or some other portion of the motor tract of one hemisphere of the brain, above the decussation of the motor fibres in the pyramid of the medulla oblongata.

Causes.—Where there is a sudden onset, the causes may be the following involvements of the cerebral arteries :—

1. Haemorrhage, usually in patients above 45 years of age.
2. Injury.
3. Embolism and thrombosis from syphilitic endarteritis in middle-aged people.

Where the onset is gradual, the causes may be :—

1. Abscess in the brain.
2. Tumour in the brain.
3. Chronic meningitis and pachy-meningitis.
4. Chronic degeneration of the nervous system.
5. Anaemia, Diphtheria, pregnancy, etc., causing altered blood state.

Symptoms.—Where the onset is sudden, the symptoms are those of a stroke or Apoplexy. The intensity of the trouble may

vary. The paralysis may come on very slowly, or at once. It is always found on the side opposite to that where the haemorrhage takes place in the brain.

Aphasia—that is the loss or change in the power of speech that takes place in a right-sided Hemiplegia.

The reflexes on the paralysed side are increased, as the brain cannot control them when they set in.

During the early part of the trouble, there are redness and heat in the affected area, but later coldness and cyanosis supervene.

Sensibility is not much affected, although it is slightly lowered.

Due to want of use of the paralysed limb, the muscles of those limbs begin to atrophy to a certain extent, but they do not get totally atrophied, as these still retain their connection with their trophic centres in the anterior horn of the spinal cord.

The duration of the disease is uncertain. It may be cured in course of 3 or 4 weeks. Recovery is effected usually by the gradual re-absorption of the blood clots, so that the pressure on the surrounded area of the haemorrhage is lessened. The trouble in the face first disappears, and the power in the leg comes back before the arm. Again in some cases, there is recovery progressing to a certain extent during the course of the first 2 or 3 months, and then the progress stops.

Along with the paralysis, certain amount of contracture of the muscles develops, as the flexor muscles recover earlier. The elbow gets slightly bent, and the fingers are flexed into the palm of the hand. Some resistance and pain are felt if the hand is forcibly straightened. The knee is slightly bent, and the foot is extended at the ankle.

Mental symptoms are not uncommon in a case of Hemiplegia. There is a certain amount of confusion of the mind and emotional weakness. The patient may cry or laugh without sufficient cause. There may be loss of memory.

Treatment.—As mentioned under Apoplexy.

If the Hemiplegia is due to some other causes, *e.g.*, Embolism, Thrombosis, Intracranial Tumours or Abscess, the treatment is slightly different.

In cases due to Embolism, nothing could further be done except precaution taken to avoid recurrence.

In cases of Thrombosis (non-Syphilitic) stimulants are required.

In Intracranial Tumours, surgical interference is to be sought for, but if they are of Syphilitic origin, Anti-Syphilitic remedies should be administered.

In case of a Cerebral Abscess, surgical interference is at once necessary.

Physical Treatment.—It should not be too late, as there will develop contracture in the affected limbs. In order to avoid that, moderate faradic current of electricity may be used.

Massage and passive movements may be started at least 2 to 3 weeks after the attack. An early attempt for physical exercise is likely to induce a fresh attack of haemorrhage.

DISEASES OF THE SPINAL CORD

Acute anterior Poliomyelitis (Infantile Paralysis)

Causes.—It is a disease which commonly affects subjects ranging from infants up to boys of 14 years of age, but usually children aged 2 or 3 years. Adults may be affected occasionally. It may be the result of some specific infective organisms which gain access into the body, through the mucous membrane of the nose and pharynx. Chill is supposed to be a determining factor. It sometimes comes on as an epidemic. It frequently occurs in the summer and autumn months. The infective microbes may often be present in the nasopharynx, and the intestines of many healthy persons. These subjects are considered as carriers of the disease.

Morbid Anatomy.—There is an acute inflammation caused by the infection. The inflammation is produced in the grey matter of the anterior cornu of the spinal cord, also in the white matter

mostly situated in the lumbar or the cervical enlargements, causing oedema and pressure in the surrounding parts. The pressure causes degeneration ; even complete disappearance and sclerosis of the affected parts, involving complete destruction of the lower motor neurons, and consequent degeneration in the nerve fibres and finally in the muscles.

Symptoms.—The incubation period is 4 to 12 days. The trouble starts with catarrh of the nose and throat with headache, vomiting or severe pain in the limbs, malaise, drowsiness or convulsion. There may be stiffness in the neck and back, and general prostration. In course of 24 to 48 hours all the muscles of the limb or limbs are affected with flaccid paralysis. Rapid wasting is manifested. There is tenderness on pressure and pain on movement. Recovery of some of the limbs takes place quickly as some of the nerve cells escape destruction, while others undergo progressive wasting. Certain number of muscle fibres in the paralysed muscle retain the power of contraction. The superficial and deep reflexes are lost in the paralysed part. When the lower limb is affected, the knee jerk is found to be absent. Sensibility is not affected. The Bladder and Rectum remain uninvolved. In ordinary cases, after the first attack of paralysis, no further damage is manifested, but the muscles that remain paralysed after the partial recovery, improve very slowly afterwards. The function of the limb is impaired or lost according to the number of muscles that are involved, and in course of time, the power of movement is improved by new combinations among the muscles which have not been affected. As one muscle or group of muscles get atrophied, the antagonistic muscles get contracted ; so deformities may develop. The affected limb becomes blue and cold due to a change in the vascularity of the limb. The circulation is retarded, and the nutrition of the bone is naturally affected ; its growth is retarded, and as a consequence deformity sets in, causing atrophy of muscles and stoppage of growth in the affected limb.

Treatment.—At the outset, rest in bed should be advised. Saline purge, Quinine and Salicylates may be administered.

In order to prevent the subsequent deformity which is very common in this disease, proper splinting of the limbs should be arranged for, and the atrophied muscles should be carefully treated. When the fever is off, and the power of movement is manifested, massage is the most valuable treatment.

Passive movements are also very useful. By massage and passive manipulation of the limbs, we cannot expect to form new nerve cells, and replace the dead cells by new ones, but we know that some of the nerve cells escape destruction, and the improvement gradually takes place in their functional activity. Massage, passive movements and active resistance exercises serve the purpose in an effective way by keeping the muscles, joints and nerves alive and in a fit condition. In the meantime, the process of repair of the spared nerve cells in the spinal cord helps the progress towards improvement.

Along with the massage, stretching of the muscles antagonistic to those that are paralysed, also the unparalysed muscles of the limb, should be continued. But undue and excessive gymnastic exercises of the muscles do more harm than good, as they will cause development of those muscles to an undesired extent, and improvement of the paralysed muscle will be materially affected.

TABES DORSALIS (Locomotor Ataxy)

It is a very chronic disease. There is inco-ordination of the movements in walking, but the muscles of the lower extremities retain full power of contraction. This inco-ordination is a very late symptom.

Causes.—It is almost confined to people between the ages 25 and 40, and mostly among the male sex. Syphilis is almost always the chief factor in the causation of this disease. A hereditary predisposition, especially alcoholism in the parents may often be traced. Malnutrition, also prolonged bodily fatigue combined with exposure to chill, injuries to the Spine and sexual excesses are the exciting causes attributed to this malady.

Symptoms.—The disease runs a prolonged course, and the symptoms are most varied. But loss of knee jerk is always a prominent symptom.

The symptoms may be grouped into 3 stages.

1. Pre-ataxic stage.
2. Ataxic stage.
3. Paralytic stage.

1. **Pre-ataxic Stage.**—During this stage, there are always vague disturbances of sensation.

"Lightning pains"—severe, shooting or stabbing pains are experienced in the muscles of the lower extremities, but not in the joints.

The pain comes on suddenly without any warning, and subsides in a very short time, and may recur again with irregular intervals.

The knee jerk is absent from the very beginning of the manifestation of the symptoms.

Pain of various sorts, affects the patient in this stage. A "girdle pain" round the waist is very common. There may be gastric pain with vomiting, or Rectal pain followed by constipation.

There is "Argyle Robertson Pupil" found in most of the cases. The pupil does not contract to stimulus of light, but the accommodation for near vision remains normal. There may be inequality of the pupils.

There are many different anaesthetic and paraesthetic symptoms. Scattered patches of anaesthesia, especially along the ulnar border of the hand and on the soles of the feet, giving rise to a sort of sensation like "Treading on cotton wool" becomes evident. Sometimes, the patient thinks as if he has no face because of the anaesthesia of the lips, tip of the nose or of the face.

Sexual power may be diminished, or even lost. Sometimes there is perversion.

Symptoms as "Charcot's Disease" is very common during this stage. The joint becomes swollen, there is regular osteo-arthritis formed with erosions of the cartilage, wasting of the head of the bone and ossification of ligaments. But the common symptoms—pain, heat and redness—are absent in this swelling. The knee joint is the most favourite place for this sort of osteo-arthritis in locomotor Ataxy.

2. **Ataxic Stage.**—The prominent symptom in this stage is muscular inco-ordination (Ataxy) of the lower limbs. The gait becomes characteristic—the patient finds it difficult to balance himself. 'Romberg's Symptom' (if the patient is asked to stand, putting his feet close together, with the arms hanging by the sides, and at the same time to close his eyes; the next moment he loses his balance and falls) is manifested. At first he is a bit unsteady in his gait, feels much difficulty in walking straight, also has to look at his feet and the path he is following. He keeps his legs wide apart when walking, swings his foot forward, and strikes the ground with the heel.

3. **Paralytic Stage.**—This stage starts when the disease has become chronic. The paralysis starts very slowly after the inco-ordination has reached the extreme point. In this stage, Bladder

complications and Bulber paralysis, or frequently General paralysis of the insane may set in.

Morbid Anatomy.—The common changes that take place in a case of Tabes Dorsalis are degeneration of nerve fibres and interstitial sclerosis (formation of connective tissue in between the nerve fibres) in the Posterior Columns, nerve roots and horns of the Spinal cord. Similar changes take place in the Sensory fibres of the Peripheral nerves also. In ordinary cases, the degeneration affects the nerve fibres of the legs and the entire Posterior columns of the Spinal cord in the Lumbar regions. In chronic cases, it gradually spreads upwards into the Cervical regions.

Treatment.—At first, perfect rest in bed should be advised. Plenty of fully food should be given. Ergot and Belladonna may be administered where there is severe pain indicating congestion in the Spinal cord. Often Aspirin gives great relief.

Tobacco, Alcohol, sexual excesses, and exposure to cold should be avoided.

Apart from medicinal treatment, Electricity and graduated exercise are of much value.

Massage on the spine is of great value. The pressure should be moderate and applied from above downwards ; it should also be of a vibratory character. Avoid severe pressure as that may increase the congestion.

The nerves supplying the affected muscles, should be massaged regularly, to increase blood-supply to those nerves.

The muscles should be massaged twice daily with moderate pressure ; this will increase the circulation, and consequently help the nutrition of the nerves.

When Bladder or Bowel complications manifest, massage of the hypogastric region with the tips of the four fingers of the hand in a circular way, right and left alternately should be given. Shaking of a vibratory character should also be employed.

For the Bowels, the patient should be made to sit down, and asked to practise Exercise No. 10, and later on, Exercise No. 10(a). The position should be sitting on a chair,

As regards the exercise of the muscles of the lower extremities that are affected most in Locomotor Ataxy, the procedure should be very moderately, carefully and methodically attempted.

Every individual joint should be given passive movements separately. Active and simple balancing exercises should be given later on.

Care should be taken to avoid fatigue, as that will make the case worse; the reason being that the patient cannot form any idea of the amount of fatigue he has undergone during the exercise. The exercises should be regulated by the number of movements performed. The number should be increased very carefully, and gradually. The sign of fatigue should be detected by examining the pulse rate, which rises with the appearance of fatigue.

Exercises.—The ataxy in Tabes cases is due to the lowering of muscle sense. So when performing a movement, the patient has no distinct perception of the movement, nor the exact position of his body during the movement. Naturally, when performing those exercises, he cannot direct with judgment the necessary will power to the muscles that are responsible for the movement. So regular and systematic exercises under proper supervision will gradually improve the very small amount of muscle sense left in the patient.

The exercises should be performed slowly, and without resistance. The patient should be asked to carefully watch the movements when they are performed in a passive way, as visual impressions will react on the motor influence.

Exercises.—Group 1. Passive movements imitating the following exercises Nos.—26, 29, 30, 31, 31(a), 42, 42(a), 43.

Group II. The patient remaining in a lying down position with a back rest, the trunk slightly raised, making an angle of 45° degrees with the floor behind. The masseur or the physical instructor starts the following movements, manipulating the patient's lower extremities.

(a) The heel of the right foot is placed on the left foot, it is pushed slowly upwards along the front of the shin right up to the left knee by gradually bending the right leg. The right leg assumes now an everted position. Adduct the right leg, push the right foot slowly downwards back to the original position.

The same process is applied to the left leg.

(b) Cross the legs alternately, the right on the left and the left on the right, and bring them back to the original position.

(c) The masseur puts a mark on the right leg of the patient, and places the heel of the left foot on that point, and so on he moves the left foot on several such points on the marked leg. He repeats the procedure on the left leg in a similar manner. Throughout the period he should ask the patient to fix his attention on the points aimed at.

Group. III. (a) Exercises Nos.—13, 15, 16, 16(a).

(b) The patient standing, the masseur puts some points on the ground, and asks the patient to put first his heel, and then the toes of one foot; and then perform a similar movement with the other foot.

Group IV. Walking exercises.—During this exercise, the masseur should remain all along by the side of the patient, (better two persons one on either side, to start with) and help him to walk on a mat a few yards long, and 9" to 10" wide. The whole length of the mat being divided into spaces equal to the size of one full step, by cross markings, and these full steps again subdivided into $1/4$, $1/2$, $3/4$ steps. The patient standing at the end of one cross marking, should be asked to put one foot, say the left foot, at one end of the mat, and put his whole body weight on the left foot. Then he raises the right foot,

puts it side by side with the left, halts for a moment, and then puts his body weight on the right, before lifting the left foot for the onward progress, by movements of the right and the left foot alternately. He should always look at his feet, and the path he is following,—at first the $\frac{1}{4}$, $\frac{1}{2}$ and then $\frac{3}{4}$ and finally the full steps should be practised. Care should always be taken so that the patient does not leave the track, or put his foot outside the mat; neither should he be allowed to fall, as this latter condition will retard the progress very much. After going on for 3 weeks, or so with these walking exercises, the patient should be asked to walk backwards, also sideways with similar precautions as during the forward walking.

After about 6 weeks or so, the patient should be asked to perform the exercises as in Group I and Group II without the help of the masseur who may stand by, and help him if necessary. The movements should be slow and without any jerk, the patient should now be asked to practise a few other exercises such as sitting on a chair or a stool, and try to put on socks, boots and shoes by himself.

Massage should be continued for a long time.

PSEUDO-HYPERTROPHIC MUSCULAR PARALYSIS

Causes.—It is a hereditary malady, usually handed down to succeeding generations through the mother. The symptoms manifest usually before puberty. It is more common in males than in females.

Symptoms.—Children are always the victims. The usual age of occurrence being four to thirteen years. Weakness of the legs is the prominent symptom. There is an increase in the volume of the Glutei and the Calf Muscles. The chief characteristic symptoms are—when the patient lies down, he cannot get up without clambering on his knees. He assumes a waddling gait, and is easily tired in walking. Another peculiar symptom

is that, when somebody tries to lift the child under the arms, its shoulders slip up to the ears.

The muscles that appear to be increased in volume are the Calves, Glutei, Deltoid, Supra-Spinatus and Infra-Spinatus. The Calves are usually found to be extraordinarily stiff due to the exuberant growth of fibrous tissue in the interspaces of the muscles. The muscles that appear to be thinned down, are the Latissimus Dorsi, Teres Major and the lower two-thirds of the Pectoralis Major.

There is no change in the muscles of the hand.

Morbid Anatomy.—The abnormally developed muscles of the Hip, the Calf, or the other hypertrophied muscles, when seen under the microscope, are found to consist largely of fibrous and fatty tissues, the muscular fibres being thinly scattered throughout. The connective tissues between the muscle fibres are found to be increased.

Prognosis.—It always takes a progressive course, and is very slow in its progress too. The patient may live for ten to forty or fifty years, but usually the patient may die within six or seven years since he has become quite unable to stand.

Treatment.—Medicines are of no use in a case of Pseudo-Hypertrophic Muscular Palsy. The progressive wasting may be retarded by systematic and carefully selected physical exercise and proper massage,

Exercise recommended.—

Group I.—For the improvement of the wasted muscles of the shoulder girdle, Latissimus Dorsi Muscles and the lower two-thirds of the Pectoralis Major, the following exercises should be attempted.

Exercises Nos.—5, 6, 7, 8, 22.

Group II.—For the thigh muscles.—Exercises Nos.—13, 51, 61, 54, 54(a), 63, 56.

When there is some increase in the strength of the thigh muscles, the patient may try the deep knee bends by holding the back rest of a chair, and without the help of the masseur.

Group I and II should be attempted together.

The patient should be asked to walk fast, and in that procedure he should be helped by the masseur.

Massage.—It should be regularly applied twice daily for 15 minutes, and specially before and after the exercise.

To increase the power of digestion, the following exercises should be practised with the help of the Physical Instructor.

Exercises Nos.—9, 10, 10(*a*), 22, 23, 26, 27.

CHAPTER VII

DISEASES OF THE URINARY SYSTEM

The Kidneys are the chief organs responsible for the production of the urine. But in the treatment of the Diseases of the Urinary System, the physical examination of the Kidneys is of secondary importance to that of the Urine. So before proceeding to examine the Kidneys, the physician should study the patient's recent urine examination report which will help him a great deal in making the diagnosis of the disease, from which the patient is suffering.

The Urine Examination consists in the observation of its :—

1. Physical characters.—
 - (a) Specific Gravity.
 - (b) Diurnal quantity.
 - (c) Appearance.
 - (d) Odour.
 - (e) Reaction.
 - (f) Presence of deposits
2. Chemical Analysis.
3. Microscopical Examination.

Specific Gravity.—The average normal Specific Gravity of the Urine is taken as 1015. It usually varies between 10151025. The variation depends chiefly upon the presence of urea and chlorides. The Specific Gravity must be considered in relation to the quantity of urine passed. In Diabetes Mellitus the Specific Gravity of the urine increases to a great extent ; it may range from 1030 to 1045 or 1050.

Diurnal Quantity.—In healthy subjects (adult) normally 40 to 50 ounces of urine are passed during 24 hours. But it all depends

upon the amount of fluid taken, and the quantity passed out through the skin as perspiration.

Appearance.—The colour of the urine depends upon the amount of pigment present in it. Normally, the urine is pale yellow. When the urine is concentrated (*i.e.* small in quantity in proportion to the pigment present in it), the colour becomes dark in appearance. In diseased conditions, the colour of the urine assumes many different shades. Thus, if there be bile present in the urine, the colour would be dark-orange to brown; and with reflected light it will assume a greenish tint on the surface. If the urine be of a dark-red or of porter colour, or slightly smoky, the urine contains bile in it. If it is blackish brown, it is due to melanin and certain oxy-acids. If milky, the urine contains chyle; and the patient may be suspected to be suffering from "Chyluria."

The absorption of some special drugs causes a distinct change in the colour of the urine. Thus if the urine be of a dark olive green or distinctly black colour, it may be due to the absorption of carbolic acid or its allied substances such as salol, tar etc. If it is reddish brown, there may be absorption of rhubarb, chrysophanic acid or senna. It is bright yellow in colour when santonin is taken in excess.

Odour.—The normal odour of urine is aromatic. The excretion of certain drugs causes change in the odour of the urine. Thus the urine smells like copaiba when it is excreted in the urine, after the administration of a few doses of that medicine.

Reaction.—The normal urine gives an acid or faintly acid reaction, turning the blue litmus paper deep or faintly red, due to the presence of acid sodium phosphate in it. This reaction is found, if the urine is examined shortly after it is passed. But if the urine is allowed to stand for a pretty long time, decomposition sets in, the urea (normal excretion) is transformed into ammonium carbonate, and the urine gives an alkaline reaction.

In certain diseases, and when the patient is undergoing an alkaline treatment, the urine gives an alkaline reaction (turning red litmus blue).

The urine sometimes gives a neutral reaction.

Usually when the urine is alkaline during its presence in the bladder, the inner part of the bladder as well as the urethra may favour the growth of bacteria in them.

Deposits.—The common indication of deposits in the urine is cloudiness of the urine detected by the naked eye. In healthy urine, there is no deposit. The urine becomes turbid with excretions of some abnormal substances; or it may be due to the presence of an excess of the normal constituents.

If the urine contains sandy deposits, resembling red pepper, they consist of uric acid.

If there are deposits of fine white points on the surface of a cloud of mucus which settles at the bottom of the urine, the sediment consists of calcium oxalate.

When after cooling an acid urine, there form deposits which look bulky, pinkish and turbid, the urine contains lithates.

The presence of vesical mucus in the urine is normal; but when it is in excess along with epithelial cells, it makes the urine a little cloudy.

When there is pus in the urine, it presents the appearance of phosphates to the naked eye. But it is correctly distinguished from the phosphates by chemical as well as microscopical tests.

When the urine contains plenty of bacteria in it, it assumes a cloudy appearances. This cloudiness cannot be cleared by the cold nitric acid test, or by boiling.

The chemical analysis and the microscopical examination of the urine are not within the scope of this publication, so they are not described here. Other books on this subject may be consulted for that purpose.

MOVABLE AND FLOATING KIDNEY

In normal conditions, the kidney is not a fixed organ. It moves up and down with the respiration. But this movement is not usually detected on palpation.

There are three abnormal conditions under which the kidney can be felt with the hand :—

1. Palpable Kidney.
2. Movable Kidney.
3. Floating Kidney.

PALPABLE KIDNEY

This is a condition when the lower half or a major portion of the kidney can be clearly felt during a deep inspiration. When the subject is too much emaciated, the thinness of the abdominal wall and the intervening abdominal fat make the kidney easily felt by the examiner's hand.

MOVABLE KIDNEY

Movable Kidney is a condition in which the kidney can be moved more or less freely in the abdomen. The upper margin of the organ can be easily defined by the hand during inspiration ; and it can be held back from returning to its former position during expiration. It is much more common in women than in men. More often the right one is affected, because of the two reasons :—

1. The renal vessels are longer on the right than on the left side.
2. The descending colon (on the left) is more fixed than the ascending colon (on the right).

Causes.—The normally fixed position of the kidney is maintained by :—

1. Firm packing of fat round the organ ; the fat lying between the layers of the peri-nephric fascia.

2. The tension caused by the intra-abdominal pressure.
3. The abdominal parietis consisting of muscular elements.

The pathological condition "Movable Kidney" is usually effected by any condition that seriously causes a change in the above mentioned factors maintaining its more or less fixed position namely :—

- (a) Rapid emaciation, causing looseness of the connective tissue and fat round the kidney,
- (b) Decrease in the intra-abdominal pressure due to the loss of Omental fats.
- (c) Flabbiness of the muscles of the abdominal parietis, causing the belly pendulous.
- (d) Repeated pregnancy.
- (e) The patient resuming the erect posture too early, or undergoing manual labour without any proper external support after parturition.

The last condition is responsible for its presence in a great number of patients amongst the poorer classes.

Symptoms.—The Movable Kidney may be present in a patient for a long time, without any manifestation of symptoms. The patient is usually of a neurotic type, and gives hysterical symptoms, if he is aware of his troubles. He complains of nausea and vomiting when an unusual lump simulating a tumour is felt in the abdomen. Vomiting is a prominent sign in a case of Movable Kidney. There is acute pain felt whenever the organ is disturbed, or pressed pretty hard by the physician, during a physical examination. The pain is of a shooting character. It may be referred to the back ; or a sharp pain may shoot along the ureter down to the testes in the male, and labia in the female.

There is occasional shortness in the amount of urine which is due to the kinking of the ureter. The patient feels sudden relief after a copious flow of urine containing some muco-pus.

The urine contains phosphates.

Treatment.—To restrain the mobility of the organ, pressure should be applied cautiously. The use of an abdominal belt in which an air cushion (triangular in shape, and the three sides of which are parallel to the costal margin, the *linea semilunaris* and the *poupart's ligament* respectively) has been fixed as a pad, helps to restrain the mobility. This cushion, when placed properly, will hold the kidney in position.

Before using the belt, the patient should undergo an intensive treatment, which is as follows :—

The patient should be advised to stay in bed for a period of three months. During this period, he should be supplied with plenty of nutritious and fatty foods which will help him to grow fat in the perinephric tissue, and eventually allow the kidney to get imbedded into its proper position.

Exercises :—

Group I.—For the General constitution.

Exercises Nos.—1, 2, 3, 4, 5, 44, 14, 15(a).

Group II.—For special tone and strength of the parietal muscles of the Abdomen.

Exercises Nos.—22, 23, 24, 25, 27, 29.

Group III.—For the special strength and development of the *psoas*, *Iliacus*, and the other intra-abdominal muscles.

Exercises Nos.—27, 42, 42(a)—The movements should be slow.

Massage.—Regular Abdominal Massage should be done. Refer to the Introduction page XXII. Light strokings and vibrations should be given up and down on the kidney region of the abdomen once daily, for 5 minutes to 10 minutes. This procedure should be followed by Abdominal Kneadings, very light and moderate, and should be continued for another 10 minutes. The Massage should be applied about 3 to 5 minutes after the exercise.

The Exercise should always be practised after putting on the belt. Without the belt on, no exercise should be attempted.

The patient should always assume a recumbent posture when putting on a belt, preferably with the pelvis slightly raised. Before putting on the belt slight manipulation of the kidney should be done if necessary, so as to replace the organ, and to relieve any kinking of the ureter.

FLOATING KIDNEY

In this, the kidney can be moved about the abdomen, almost in all directions. In some cases, the kidney can be moved even across the middle line. It is as a matter of fact a congenital condition. The kidney like the intestines is completely covered by the peritoneum, and is held in the abdomen by a mesentery. It is usually a rare occurrence.

NEPHRITIS

It is an inflammatory condition of the kidney. It may occur in many different conditions, manifesting many different urinary disorders, with their specially important symptoms such as the following :—

1. Albuminuria.
2. Haematuria,
3. Pyuria.
4. Change in the specific gravity.
5. Polyuria.
6. Glycosuria.
7. Opacity due to the presence of urinary deposits.
8. Suppression of urine.
9. Retention of urine,
10. Incontinence of urine.
11. Renal enlargements.

Only those urinary disorders in which Physical Exercise is possible as well as beneficial, have been dealt with in this treatise,

ALBUMINURIA

It is a disease characterised by the presence of albumin in abundance in the urine.

Causes.—The presence of albumin in the urine is usually peculiar to Nephritis, but it accompanies various other disorders.

The following are the conditions in which the presence of Albumin is manifested due to some functional, temporary or premanent disorders of the kidney. —

1. Functional albuminuria of adolescence.
2. Temporary albuminuria due to disturbance of digestion.
3. Acute infective fevers.
4. Acute and chronic nephritis.
5. Atrophic cirrhosis of the kidney.
6. Suppurative Nephritis.
7. Tubercular Kidney.
8. Malignant Endocarditis.
9. Disturbance of the circulation and venous obstruction in Heart and Lung diseases.
10. Temporary obstruction in the Ureters.
11. Effects of absorption of certain poisonous drugs in the system.
12. New growths in the Kidney.
13. Chronic systemic diseases *e.g.*, Diabetes, Anaemia and Leukaemia.

The presence of Albumin in the urine may be due to disorders in the urinary passages which are as follows :—

1. Tubercular disease of the pelvis of the Kidney or the Bladder.
2. Inflammation of the Bladder.

The diseases in which Albuminuria is a marked symptom, and Physical Exercise is suitable, has been dealt with in this present chapter.

ACUTE NEPHRITIS (Acute Bright's Disease)

It comes on suddenly. The urine is diminished, and the presence of albumin is the chief characteristic. The urine also contains tube casts. It is an inflammation of the paranchyma of the organ.

Causes.—1. It is occasionally a complication of acute specific fevers.

2. A sudden chill.

3. Trauma *e.g.*, a blow on the kidney.

4. Extension of inflammation from the diseased portion of the urinary tract below the kidney.

5. Continual administration of certain drugs *e.g.*, Turpentine, Cantharidine, etc.

6. Pregnancy.

Symptoms.—1. There is rise of temperature for 4 or 5 days, with occasional vomiting, headache and drowsiness during the early stage of the disease.

2. The presence of a large quantity of Albumin in the urine is a prominent symptom.

3. There is diminution in the quantity of the urine. It may be so small as 10 to 15 ounces a day.

4. The urine is smoky due to the presence of blood in it.

5. Dropsy is usually noticed in the face, and in the loose areolar tissue in the genitals. It may affect the serous cavities, as well.

6. The skin assumes a wax-like hue.

7. If it passes on to a chronic form (chronic nephritis), the pulse assumes a high tension, and the aortic second sound is accentuated.

Treatment.—1. The patient should be kept in bed.

2. Diaphoretics should be given internally.
3. Warm baths, hot air baths and wet packs should be applied.
4. Dry cupping should be resorted to.
5. Saline purgatives should be administered.
6. Tonics recommended.

During convalescence, Tonics such as Tinct. Ferri Perchlor will do a lot of good. The patient should not expose himself to chilly and wet weather. Non-irritating and non-stimulating diet *e.g.*, milk and farinaceous food is preferable. Meat diet should be religiously avoided.

Exercise.—Breathing exercises with light movements of the limbs should be advised. The following Exercises are recommended.

Exercises Nos.—1, 2, 3, 4, 5, 44, 34, 34(a), 35, 39, 40, 54, 13.

CHRONIC TUBAL NEPHRITIS (Large White and Fatty Kidney)

Chronic Tubal Nephritis may be the sequela of an acute attack, or it may come on insidiously.

Morbid Anatomy.—In Chronic Tubal Nephritis, the kidneys become large in size, and assume a greyish white colour—"Large white Kidney." The surface is smooth, and the capsule strips off easily. On section, the Cortex is found to be broader than normal, the colour being yellowish white, the Pyramids are of dark red.

When examined under a microscope, the Malpighian Capsules are seen to be thickened, and the Glomeruli inside the capsules are pressed from all sides by proliferation of the epithelium overlying them. The Convolute Tubules are filled with epithelium which have undergone Fatty and Granular degenerations. The straight tubes are filled with granular and epithelial casts. The interstitial tissues are infiltrated with leucocytes.

During an attack of Chronic Tubal Nephritis, the paranchymatous tissue of the kidney is involved. When the disease becomes more and more chronic, the connective tissue is increased, and in the long run, it becomes encysted, and a small "White Kidney" results.

Causes.—1. Predisposition—It is common in people of middle age, and more rare in the old and children.

2. Intemperate habits.

3. Excessive physical and mental strain, also sexual excesses may predispose an attack of Chronic Tubal Nephritis.

It is usually a sequela of an acute tubal nephritis, but it may come on insidiously without any apparent cause. It may be due to prolonged mechanical congestion of the kidney due to cardiac trouble.

Malaria, Syphilis or Tuberculosis sometimes may be the cause.

Symptoms.—There is an excessive quantity of albumin present in the urine. The quantity of urea is found to be diminished.

In the early stage of the disease, the quantity of urine markedly diminishes, but towards the end when the kidney becomes contracted, the quantity markedly increases. The specific gravity is at first high, but later on becomes low. The urea is below normal, Granular Hyaline and Epithelial casts and leucocytes are present. In some cases, blood is found in the urine.

As this sort of chronic condition goes on for a long time, the heart becomes hypertrophied; and the arterial walls become thickened; the first sound of the heart is reduplicated, and accentuation of the second sound is marked in the Aortic area. The Apex beat is displaced outwards. There is high tension in the pulse.

There is dropsy marked especially in the face. But later on when the quantity of daily urine increases, the oedema in the face disappears.

Treatment.—The treatment is practically similar to that of Acute Nephritis. Rest in bed, and constant use of flannel clothing to promote warmth and perspiration are imperative.

Regular administration of purgatives is essential to keep the bowels clear.

Tonics such as Tinct. Ferri Perchlor are beneficial.

Diet.—The nitrogenous element in the diet should be religiously omitted. Milk should be given in plenty, with a reasonable amount of farinaceous foods.

Exercise.—

Group I.—Ex. Nos.—33, 34, 35, 39, 57, 58 for one month.

Group II.—Ex. Nos.—1, 2, 3, 4, 5, 17, 40, 54, 54(a) in addition to Group I for one month.

Group III.—Ex. Nos.—9, 19, 64, 64(a) in addition to Group I and II.

CHRONIC INTERSTITIAL, NEPHRITIS (Cirrhotic Kidney)

Symptoms.—Although albuminuria is a symptom in this disease, the quantity of albumin present in the urine is practically small.

The onset is slow. It is a disease which generally affects middle-aged people.

The chief symptom is the passing of an excessive quantity of urine during the day and night. The Specific Gravity of the urine is low, there is a slight decrease in the total urea passed during 24 hours. The urine is pale, clear, and contains but a few casts, of the Granular or the Hyaline type.

Usually there is slight oedema or little puffiness of the eyelids. Sometimes there is considerable dropsy.

There is persistent high tension in the pulse, associated with hypertrophy of the Left Ventricle of the Heart. The Aortic second sound is accentuated, occasionally with a murmur in the first sound, due to Mitral Regurgitation, Sooner or later all the arteries of the body become thickened,

Due to deficient nitrogenous metabolism in the body, there is chronic insipient uremia.

Headache, insomnia, gradual loss of vigour, digestive disorders and paroxysmal dyspnoea are characteristic symptoms.

Causes.—It is a disease which occurs during the middle and advanced period of life (between 40 and 50 years of age).

It is more common in the male than in the female, and in people living in temperate climates.

Heredity is partly responsible for the causation of this disease.

Morbid Anatomy.—The size of the kidney is greatly reduced. The shape of the organ is not materially altered. The whole external surface of the organ is seen to be covered with very small elevations (granulations) of $\frac{1}{6}$ to $\frac{1}{8}$ of an inch in size, and the intervening space between the granulations, may be occupied by minute cysts containing colloidal matter. Due to an overgrowth of the interstitial tissue, and the increase of the vascularity of the part, the whole organ looks red or brownish red in colour, and it becomes tough to feel.

Treatment.—Medicine—Daily administration of purgatives such as Mag. Sulph. will help the elimination of those poisonous materials that could not be eliminated through the kidneys; it will also relieve the arterial tension, and thereby the heart will be relieved of the strain. Tonics will do a lot of good.

Diet.—Diet plays a very important part in the treatment of Chronic Interstitial Nephritis.

1. The amount of proteid intake with the food should be reduced strictly to its minimum.
2. Alcohol should be strictly avoided.
3. The patient should live in an equable climate.
4. Flannel clothings should be strictly adopted in order to avoid chill.
5. The action of the skin should be maintained by
Physical Exercise.

Physical Exercise.—Exercise should only be recommended in cases of definite Chronic Interstitial Nephritis. The chief aim in this sort of treatment is to improve the circulation, and relieve the high tension in the pulse which have been caused by chronic thickening of the arterials walls, as well as to help the elimination of the nitrogenous waste from the system.

Exercise.—It should be on a line similar to that mentioned under "Chronic Tubal Nephritis"—special stress being put on the breathing exercises.

Massage.—Very light massage (foulage also vibrations) may be given for 5 minutes, before and after the exercise—in two positions.

1st position.—The patient lying on his back in a soft bed, (Fig. "Foulage" Page ix Introduction), The masseur applies foulage also vibrations with the three fingers (the index, middle and the ring fingers) of his hand. The massage is applied on the Abdominal Wall on the Right and Left Lumber regions with moderate pressure. Both the Foulage and the Vibrations should be given with circular movements (with and against the hands of a watch). The foulage is applied with the three fingers kept closed, while the vibrations are given with the finger tips being used alternately, causing intermittent strokes to fall on the field of operation.

2nd position.—The patient sitting on a chair, leans forward, and rests his head on some support. The masseur standing behind the patient, applies friction and foulage on the region of the kidneys. When massaging the Right Kidney, he stands to the left of the patient; and stands to the right when massaging the left kidney.

The abdominal massage should be done before the exercise. But after the exercise, both the Abdominal as well as the Back massages should be performed,

ALBUMINURIA OF ADOLESCENCE

This disorder is purely of a physiological origin, and is due to some changes in the vaso-motor system. It appears regularly at some hours in the morning every day, and disappears at night. Sometimes it follows a cold bath, or when the patient retains a horizontal position for a long time. It appears without any warning, and lasts for a few days or weeks together. Under this head the following disorders may be mentioned :—

1. Dietetic Albuminuria.
2. Athletic Albuminuria.
3. Postural Albuminuria.
4. Paroxysmal Albuminuria.
5. Neurotic Albuminuria.

DIETETIC ALBUMINURIA

The intake of a large quantity of albumin in the diet such as eggs, etc., or even an excessive quantity of a mixed diet causes Albuminuria. In the former case, the excessive quantity of albumin that has been taken, digested and assimilated in the system, is more than what the system can utilize in the process of construction of tissues, so it becomes a toxin, and naturally it must be got rid of. It passes out of the system as albumin in the urine. In the latter case, excessive quantity of Oxalates taken with the diet containing vegetables such as rhubarb, spinach, cabbage, strawberries etc., on reaching the kidney, irritates the organ, and facilitates the passage of Albumin in the urine.

Treatment.—The cause should be carefully investigated. The intake of albumin and the vegetables or some such articles of food containing plenty of oxalates, should be carefully avoided, or at least cut down to an absolute minimum.

The bowels should be kept clear, the patient should be strictly regular in his habits.

Exercise.—For the improvement of the general constitution, the following exercises should be practised :—

Exercises Nos.—1, 2, 3, 4, 5, 44, 9, 17, 18, 64, 64(a), 14, 15.

For the improvement of the digestion and the free movement of the bowels, the following exercises should be attempted.

Exercises Nos.—10, 10(a), 24, 26, 27 and 29, 42, 42(a).

ATHLETIC ALBUMINURIA

In this, albumin is found in the urine of some people shortly after a severe and prolonged physical strain such as a "Marathon race", long distance "Rowing", or a long-continued physical exercise suddenly adopted to prepare for a wrestling contest, etc. It is a temporary disorder, and is due to severe strain on the vascular system caused by the unusual and excessive physical exertion telling upon the "glomeruli" of the kidneys, the result being the passage of albumin in the urine.

Treatment.—As it is a temporary disorder, and is due to the sudden and excessive strain on the muscular system, perfect rest and light diet administered for a short period will cause the albumin to disappear from the urine.

These subjects should strictly avoid sudden and severe physical exercises.

Postural Albuminuria.—Subjects, especially young adults and youths apparently in good health, suffer from this disorder.

Symptoms.—The appearance of albumin is not detected in the early morning urine. It is usually present in the urine passed during the period between 9 a.m. and 6 p.m. and disappears from the urine passed during the night.

Causes.—In these cases, the cause is attributed to the erect posture and exercises (movements) during the day. Again, the disappearance of albumin is effected by rest and recumbent posture at night. The quantity or the quality of the food taken, is in no way responsible for this disorder. Some of these "postural albuminuria" cases as they are called are due to "Lordosis" present in the subject. The peculiar lordotic condition of the spine causes

pressure of the renal veins on the kidneys when the patient assumes an erect posture. But when he stoops forward, the pressure is relieved.

PAROXYSMAL ABUMINURIA

In this, Albumin appears in the urine without any apparent cause ; and it continues passing in the urine for a few days or weeks together.

It is usually associated with Paroxysmal Haematuria or Oxaluria. The latter disorder has been dealt with in this book under the head "Oxaluria".

NEUROTIC ALBUMINURIA

This disorder may be due to disturbed enervation caused by :—

1. Severe shocks, burns etc.
2. Severe mental strain due to excessive study.
3. Increase intra-cranial pressure due to cerebral Tumours, etc.
4. Exophthalmic goitre.

Treatment.—The cause should be found out, and attempts should be made to remove it by relieving the strain in cases of excessive study ; or resorting to surgical interference in cases where it is necessary.

Exercises.—During convalescence, the patient should be placed under healthy surroundings, and allowed an easy life. But to improve the general physical condition, the following Exercises should be practised.

- Group I.—Exercises Nos.—1, 2, 3, 4, 5, 44, 9, 10, 17, 18, 19, 19(a), 14 and 15. Walking in the open air after the exercise should be encouraged.

Group II.—After practising the exercises mentioned under Group I for about a month, the patient should be advised to indulge in outdoor games and sports.

POLYURIA (Diabetes Insipidus)

It has been dealt with under the heading "Diabetes".

GLYCOSURIA (Diabetes Mellitus)

Although the passage of sugar in the urine is the chief symptom of Glycosuria, it is as a matter of fact a constitutional disease. So it has been dealt with under the heading "Constitutional diseases".

RENAL CALCULUS

There are several kinds of Renal Calculus. The following varieties are usually found:—

1. Oxalates.
2. Uric Acid.
3. Urates.
4. Phosphates. { Calcium Phosphates
 Ammonio-magnesium Phosphates
5. Calcium Carbonate.
6. Indigo.

When the urine examination report elicits the presence of one or the other of the above-mentioned calculi in excess, or even in a minute quantity in the urine, it draws the attention of the physician as well as the patient.

When those calculi are present in great number in the urine, the patient usually gets colic (Renal colic) with its peculiar symptoms.

Symptoms.—When the calculus is in the pelvis of the kidney, the pain may be entirely dormant, or there may be dull pain in the loins with albumin, blood or pus in the urine. The stone may remain in the pelvis of the kidney for a long time, and gradually increasing in size too big to pass through the ureter,

it gives rise to Pyelitis, Pyelonephritis, Pyonephrosis, and so forth which require surgical interference.

When the calculi are small enough to enter the ureter, they irritate the mucous membrane of the ureter, and set up a sort of spasmodic contraction of the organ, giving rise to Renal Colic, the peculiar symptoms of which are excruciating pain of lancinating type, in the loins and the flank of the same side of the affected kidney. The pain may be directed lower down to the thigh and sometimes to the leg.

The pain is due to the blockage of the ureter by the calculus which irritates, and causes spasmodic contraction of the ureter.

In severe attacks, the patient lies curled up, he perspires profusely, and becomes collapsed. The pulse is feeble and quick. There is a slight rise of temperature, shivering, vomiting and sometimes convulsions. The testicle on the same side becomes tender and retracted. The pain may last for a few hours, or even for a day or two. There may be partial stoppage of urine for some time. The micturition is scanty, frequent and painful.

When the stone passes down into the bladder, or goes back into the pelvis of the kidney, the pain stops suddenly, and the patient is relieved with a comparatively bigger flow of urine which may contain blood discs or pus cell, but usually no casts.

Treatment.—During the attack of Renal colic, the patient should be advised perfect rest in bed. If the pain be intolerable, an injection of morphia should be given at once. Application of Local anodynes is necessary to relieve the acute pain, to remove the spasm, and cause relaxation of the ureter, and thereby help the calculus to escape.

Diet.—Warm diluent drinks or thin barley water should be given occasionally during the attack.

OXALURIA

It is a disease characterised by the presence of an unusual quantity of oxalates (calcium oxalate) in the urine. This causes the oxalic

acid calculi to be formed in the pelvis of the kidney, obstructing the ureter when passing through it, causing thereby troublesome renal colic, and progressing further down into the bladder, form into big calculi (stones), giving rise to many troublesome symptoms. It sometimes compels the patient to undergo surgical operations for the removal of the calculi.

Symptoms.—Its presence is manifested by the formation of deposits like “powdered hair” on the top of the mucus that has excreted with the urine, and afterwards settled at the bottom. These oxalates are soluble in hydrochloric acid, and are insoluble in acetic acid or caustic potash.

When examined under the microscope, these oxalates are found to be solitary deposits of colourless, dumb-bell-shaped octahedral crystals.

They are blackish brown in colour, and are very hard, irregular, also rough in consistency; so during their passage through the ureter, or their presence in the pelvis of the kidney or bladder, they gradually irritate the mucous membrane of the respective organs they come in contact with.

Causes.—Oxalates are found in the urine after a diet consisting of an excessive quantity of rhubarb, cabbage or onions.

Some people have Oxaluric diathesis. In them, there occurs an excessive formation of Oxalates in the urine as a result of Intestinal dyspepsia in which there is an excessive formation of sulphurated hydrogen. This sulphurated hydrogen gets absorbed into the system. The de-oxidising action of sulphurated hydrogen on the urates present in the urine results in the formation of Oxalates.

People who indulge in an excessive quantity of vegetable diets, suffer from acidity and Intestinal dyspepsia, eventually develop oxaluria.

Treatment.—(1) *During an attack of colic* due to oxaluria, the treatment should be as mentioned under “Renal Colic.”

(2) **Constitutional Treatment.**—The first step that should be taken in a case of oxaluria,—is to correct the “Intestinal dyspepsia.” The acidity should be removed by an in-take of Sodii Bicarb.

Diet.—The vegetables in the diet should be restricted ; articles such as, rhubarb, onion, tomato, cabbage etc. should be avoided.

Meat is permissible, although in a moderate quantity.

Exercises.—

Group I.—For the general constitution.—

Exercises Nos.—5, 44, 3, 4, 14, 17, 18, 15.

Group II.—For Acidity and Intestinal dyspepsia.—

Exercises Nos.—9, 10, 18, 17, 19, 19 (a), 20, 42, 42 (a), 27.

URIC ACID

Uric acid is usually excreted in the daily urine in combination with urates, in a small quantity about 10 to 15 grains. Its isolated presence in the urine is not uncommon. If the urine be strongly acid, the uric acid is usually precipitated. The crystals are round in shape, hard, usually smooth, sometimes faceted (several crystals being placed side by side form facets at their points of contact).

An excessive formation and retention of uric acid in the system (in the lymph spaces and in other tissues where the circulation is comparatively slow) as sodium biurates, cause Gout. This sodium biurate is deposited specially in joints and ligaments.

They may get deposited in the liver or in the kidneys, and give rise to symptoms of renal colic.

Treatment.—During the colic due to the presence of uric acid or urates—The treatment as mentioned under “Renal Calculus” is to be followed. But for the systemic treatment—Regulation of diet and Physical exercise are imperative.

Diet.—Strictly vegetable-diet is imperative. But in a chronic case, white fish may be allowed in a small quantity. The diet should

never be rich or heavy; sweets should be omitted in the diet. Milk and vegetable diet is preferable in an uric acid case. The patient should be advised to drink plenty of water between meals.

As patients having uric acid troubles usually develop gouty and rheumatic diathesis, suffer from occasional attacks of renal colic, and become subjects to subsequent high blood pressure, these people should be advised to go in for plenty of Physical Exercise (preferably indoors to avoid exposure). But in fair weather out-door exercises should be encouraged freely.

The condition of the heart should always be watched very carefully before prescribing any strenuous exercise.

Exercises.—

Group I.—For the improvement of the general metabolism and an all-round development of the body—

Exercises Nos.—1, 2, 3, 4, 5, 44, 9, 19, 19 (a), 14 and 15.

Group II.—To improve the digestion and to relieve constipation—

Exercise Nos.—9, 10, 10 (a), 19, 19 (a), 27, 42, 42 (a).

Group III.—To improve the condition of the heart—

Exercises Nos.—Deep breathing exercises generally, and light movements of the extremities as mentioned under "Treatment of the Valvular diseases of the heart."

Massage.—It is imperative in uric acid cases as these patients usually suffer from joint troubles such as gout etc.—For massage of the different parts of the body refer to the Introduction.

In uric acid cases, the affected joints should be kept well covered with flannel, so light flannel suits should be worn after the massage.

PHOSPHATURIA (Phosphates in the urine)

Phosphates are usually found in an alkaline or a neutral urine. They are especially found in large quantities in the urine passed

during the early morning hours or after dinner. Cloudiness of the urine is the chief characteristic of Phosphaturia. It is usually a concomitant symptom in chronic Dyspepsia with alkaline urine.

In excessive Phosphaturia, the diurnal quantity of urine which is markedly alkaline, is greatly increased. There are thirst, aching pain in the loins and the back, and marked emaciation.

It is found in many wasting diseases, and during convalescence after fevers.

It is diminished in acute fevers, and in diseases of the Kidneys, such as Nephritis etc.

Treatment.—In case of an acute attack, if the patient is passing an excessive quantity of Phosphates, rest in bed and warmth are imperative.

Diet.—Light, non-irritating and nutritious diets should be given. Alcohol and coffee should be forbidden.

Medicine.—Tonics with Iron, quinine and strychnine should be prescribed.

Exercises.—The chief aim should be to improve the digestion. The following exercises should be encouraged :—

Exercises.—

Group I.—Exercises Nos.—1, 3, 4, 5, 44, 9, 10, 27, 42, 42(a) and 15(a), for about a month and then—

Group II.—Exercises Nos.—17, 18, 19, 19(a) and 14 may be added to the chart.

SUPPRESSION OF URINE

It is a very serious condition. There are two kinds of suppression of urine.

1. Obstructive suppression of urine.
2. Non-obstructive suppression of urine.

Obstructive suppression of urine.—It is due to blocking of one ureter complete or partial.

Causes.—(a) Renal calculus.

(b) Tumour at the base of the bladder.

(c) Congenital malformation of the ureter.

When both the ureters are blocked, it causes latent uraemia. The patient may die in course of 10 or 12 days.

Non-Obstructive suppression of urine.—

Causes.—1. Sequence of some abdominal injury or operation.

2. Acute Phosphorous or Turpentine poisoning.

3. Embolism or thrombosis of both renal arteries.

4. Acute Nephritis.

The disease is more or less an acute trouble of a severe type. Surgical interference is almost always necessary.

RETENTION OF URINE

Symptoms.—In this disorder, the bladder of the patient is distended. This can be made out by percussing and palpating the bladder above the pelvis, or by the passage of a catheter. The onset may be sudden, or it may be gradual.

Causes.—If the onset be sudden, it is due to some acute congestion or spasm of the urethra.

If the onset be gradual, the causes may be :—

1. Impacted calculus, phimosis or a ligature round the penis (in young boys).
2. Hysteria or reflex irritation after delivery, or a tumour pressing on the neck of the bladder in women.
3. Gonorrhoea with chronic congestion of the mucous membrane of the posterior urethra. Stricture or *Tabes dorsalis* in middle-aged men.
4. Atony of the bladder or enlarged prostate in old men.

Treatment.—In cases due to spasm of the urethra, local application of hot fomentation over the perineum usually relieves the

trouble. To relieve other symptoms, surgical interference is usually resorted to.

In hysterical *Tabes* cases where the retention of urine is a marked symptom, the chief aim should be to treat the primary trouble.

In atony and simple paralysis of the bladder, the treatment should be application of a continuous Electric Current. Also massage of the bladder and the perineum.

Bladder massage.—Vibrations should be applied—making circles over the lower abdomen, with light frictions—with and against the hands of a watch.

Perineal massage.—Light friction should be given before and after the application of hot fomentation.

In cases of enlarged prostate, Prostatic massage and hot fomentations are useful.

Prostatic massage.—The patient should lie on his hands and knees. The masseur supports the patient's perineum with his left hand, and introduces the index finger of his right hand thoroughly oiled, into the rectum, slowly and gradually. He now applies the massage with a few semi-circular movements of his hand, right and left, imitating the movements of the pendulum of a clock. The number of movements should be (5 to 50). Light pressure should always be applied. After the massage, the patient should lie on his back for about 3 minutes before he gets up.

In cases with Gonorrhoea and chronic congestion of the urethra (Posterior urethritis), Prostatic massage with Electric treatment—*e.g.*, Diathermy is recommended.

Exercises.—

Group I.—Recommended for :—

- (a) Chronic urethritis in old gonorrhoeal cases.
- (b) Cases of Atony of the bladder.

Exercises Nos.—9, 29, 42, 42(a), 43, 15 also skipping (reasonable number of times 5 to 250).

Group II.—The patient should now lie on his back in a soft bed, and practise contraction and relaxation of the sphincter urethra. Number of times 5 to 50. The time for contraction and relaxation should be 2 seconds each. This will help the dissolution of the inflammatory products in posterior urethritis.

INCONTINENCE OF URINE

It is usually of two forms :—

1. True Incontinence
2. Active Incontinence

TRUE INCONTINENCE

The usual causes are :—

- (a) Paralysis and dilatation of the Sphincter after operation of Lithotripsy.
- (b) Paralysis of the Sphincter due to some cerebro-spinal affections.
- (c) Vesico-vaginal fistula.

Symptoms.—In this, the urine dribbles away involuntarily in the same rate as it is formed in the Kidneys.

It is rather a rare condition.

ACTIVE INCONTINENCE

In normal conditions, the usual period during which the urine can be retained, differs in different subjects. It depends on the quantity of the fluid drunk, and the quantity passed out in the shape of urine and perspiration. It is usually retained for four or five hours. It is longer in the female than in the male.

In the female, the habit of retention of urine for a long time is injurious, as it leads to flexion of the uterus.

Active Incontinence is a very common complaint.

Symptoms.—There is no continuous dribbling of urine as in the case of True Incontinence. The patient can hold the urine

for some time, but the calls to urinate are very frequent. Sometimes the call is so urgent, that a few drops dribble away before the patient is perfectly ready to micturate.

Causes.—The increased frequency of micturation may be due to an increase in the diurnal quantity of urine as in diabetes or chronic granular Kidney. But in true incontinence of urine, the quantity of the diurnal urine is usually normal; the only trouble is the frequency. The quantity passed during each act of micturation is small,

The possible causes are as follows :—

1. **Local.**—(due to local irritation).

(a) Hyper-acidity of the urine, causing irritation of the bladder.

(b) Enlarged prostate.

(c) Chronic Cystitis due to Tumours or stone in the bladder.

(d) Pressure caused by a displaced uterus, as in an advanced case of pregnancy,

(e) Irritation in the Kidneys due to the presence of stone etc., causing pyelitis.

(f) Reflex irritation caused by some other diseases in the neighbourhood of the bladder, worms, phimosis or too long a prepuce in young boys. Rectal troubles such as piles, fissures, polypus or prolapse of the rectum, Pelvic inflammation, Varicocele or Vascular caruncle in the Urethra in women.

2. **Constitutional.**—

(a) Hysteria.

(b) Sexual excesses.

(c) Nervous debility.

(d) Deficient aeration of the blood in cases of adenoids etc.

3. **Congenital.**—

Undeveloped sphincter urethra.

Treatment.—Removal of the cause after it has been found out, is the main principle of the treatment in a case of Active Incontinence of urine.

Regulation of diet, healthy surroundings, active habits and exercises especially calculated to improve the general physical condition are necessary.

Exercises.—

Group I.—For the improvement of the general physical condition—

Exercises Nos.—1, 3, 4, 5, 44, 9, 14, 15, 17, 18, 19, 19(a).

Group II.—For giving tone to the bladder, and to break any old inflammatory mass in the bladder—

Exercises Nos.—20, 21, 24, 29, 31, 42, 42(a), 43.

Massage.—Abdominal kneadings—The patient should lie on his back—(Refer to Introduction pages XXII—XXIII).

Massage on the sacral regions.—The patient should lie on his face—Hacking, clapping and flaggellations on the sacral region should be applied (Refer to Introduction pages XI—XII).

ENEURESIS NOCTURNA
(Nocturnal Incontinence)

Incontinence of urine during sleep, is very common in young children. Adults, even older people also suffer occasionally from this trouble.

Causes.—1. Organic causes as mentioned in Active Incontinence.

2. Acid urine.
3. Insipient insanity in childhood.
4. General debility.
5. Stone in the bladder.
6. Senile debility.

7. Irritability of the mucous membrane or the muscular structure of the bladder.
8. Worms in the rectum.
9. Insufficient aeration of the blood due to adenoids or other growths in the pharynx.
10. Bad habits engendered in childhood.

Treatment.—The cause should first of all be found out by careful local examination, and treated accordingly.

If the urine is acid, and thereby irritates the mucous membrane of the bladder, alkaline mixtures should be administered.

If the sphincter of the bladder wants tone, Nux Vomica or Belladonna should be prescribed. Pot. Bromide is also a very good remedy.

Bad habits should be removed by training *i.e.*, waking the child up at a fixed time, some 3 or 4 hours after the child has gone to bed.

Exercises.—

Adenoids—As mentioned under Adenoids.

General debility.—Exercises Nos.—1, 3, 4, 5, 9, 44.

Loss of tone in the bladder.—Exercises Nos.—9, 10, 10(a), 27, 29, 30 42(a) and 43.

CHAPTER VIII

CONSTITUTIONAL DISEASES

DIABETES

Diabetes is of two kinds.

1. Diabetes Insipidus.
2. Diabetes Mellitus.

DIABETES INSIPIDUS

It is a functional disease, in which the patient has polyuria, that is frequency of micturation as the chief symptom.

Causes.—Polyuria may be caused by disorders of the kidneys, by increased blood pressure, by increased quantity of urine associated with the presence of sugar in it—"Diabetes Mellitus". It may also be found temporarily in some disorders of the nervous system specially Hysteria. But Diabetes Insipidus is characterised by great and persistent increase of urine without the presence of albumin or sugar in it. It is due to the dilatation of the Renal vessels. Children and youths are more commonly affected than elderly people. It occurs in people with nervous temperament. Injuries on the head *e.g.*, a blow etc., are the chief causes of Polyuria. Emotional disturbances, convalescence from acute diseases, or Tumour in the brain *e.g.*, a Syphilitic Gumma often gives rise to Polyuria. Severe muscular exertion, intemperance and exposure to cold may give rise to this trouble in many cases.

Symptoms.—Symptoms may come on immediately after the intake of a large quantity of fluid. There is great and continuous increase in the quantity of urine. Great thirst and marked emaciation are the prominent symptoms. No sugar or albumin is found in the urine. The quantity of urine passed in 24 hours may be as great as 40 ounces. The specific gravity of the urine being very low about 1002 or 1004. The reaction is faintly acid.

The tongue is usually dry, so is the skin. The temperature is normal, the appetite is usually dull, but occasionally it is very keen. The Bowels are almost regular, but sometimes alternating diarrhoea and constipation are present. Sleep is much disturbed, there being occipital headache and irritability of temper.

In the ordinary mild forms of Diabetes Insipidus, the malady may last for many years, and it may remain as a source of inconvenience only. In cases due to brain tumours, the patient dies in a very short time. Cases that start in very acute forms, are not so dangerous as those starting insidiously. Death may take place from gradual exhaustion, and drowsiness which slowly pass into coma.

Sequela.—Infective Lung trouble *e.g.*, Pneumonia or Phthisis may come on insidiously.

Treatment.—As emotional disturbances of the nervous system often give rise to Polyuria, Valerian may be used with much benefit. Antipyrin is useful, Pituitary gland extract in the form of Hypodermic injections of the posterior lobe and "pars intermedia" do good in many cases. If Syphilis be the cause, Antisyphilitic remedy will facilitate recovery.

For the improvement of digestion, and nervous tone the following exercises may be recommended :—

Exercises Nos.—1, 2, 3, 4, 5, 9, 10, 14, 15, 18, 23, 24, 26 and 27.

DIABETES MELLITUS

Diabetes Mellitus is a disease in which the persistent passage of sugar in the urine is the chief characteristic. The quantity of sugar thus passed may be small, or it may be very great from 2 to 40 grains per ounce, or even more. The total amount of sugar passed during 24 hours, may vary from 8 ounces to 2 pounds. The urine that is passed during the whole day and night is tremendous, and the patient micturates very frequently.

Causes.—Diabetes occurs more frequently in males than in females, in the proportion of 2 to 3. The proportion of the frequency increases with age. It is rare in childhood, but occurs at puberty, more often in middle and advanced ages. Heredity has got a great influence in the production of Diabetes. It is more frequent in people of fair complexion than in those of dark colour, and is much more prevalent among people living in the cities than among people living in the villages. It is more prevalent in one than in other part of the world. It may be caused by some disturbance in the nervous system *e.g.*, emotion, anxiety, repeated shocks, over-work and some neurotic disorder. Obesity, indulgence in too rich a diet, and especially too much starchy food are the main causes of this trouble. Morbid changes in the internal secretion of glands such as the Liver and Pancreas, together with their functional disturbance, especially changes in the "Island of Langerhans" of the Pancreas are found in this disease.

Several experiments have suggested a relation between the Pancreas and Diabetes. The internal secretion of Pancreas has some relationship to the carbohydrate metabolism of the system. A complete removal of the Pancreas in an animal, was invariably followed by a constant Glycosuria (sugar in the urine)—the increased percentage of blood sugar, the presence of acetone in the urine, and the liver losing its glycogen and becoming fatty irrespective of the food intake. But when a portion of the Pancreas was removed, no such symptom did take place. Finally the observers came to the conclusion, that the Pancreas is the central organ concerned in carbohydrate metabolism; and that, diabetes is the result of a sort of breakdown of its function in the utilization of sugar. The immediate cause of this defect is the functional or anatomical disease of the "Island of Langerhans" of the Pancreas, causing deficiency in its internal secretion. This internal secretion in its turn, exerts an inhibitory influence on the release of sugar from the Liver, and in some way helps the utilization of the dextrose molecule by the tissues. The remote causes may be the hyper-secretion of the other endocrine glands, such as the pituitary, thyroid

or suprarenal and their action on the vegetative (great Splanchnic Nerve) nervous system, with which the functional activity of these glands is intimately associated. Emotional and nervous disturbances working through these vegetative nervous system also cause Glycosuria.

Symptoms.—1. Sometimes Diabetes comes on very insidiously, the patient may complain of weakness and loss of weight, or notices that he often feels thirsty, drinks more fluid, and has disturbed sleep at night. In many cases, the symptoms appear very suddenly after a chill, after an injury or some severe mental strain. The patient passes a large quantity of urine containing glucose, attended with gradual emaciation.

Condition of the urine.—The quantity of sugar passed in 24 hours may be from 8 ounces to 2 pounds. The patient micturates frequently, and the urine passed during the whole day and night is great, it may be 10 to 20 pints. The specific gravity of the urine, while in health is usually 1015, but in Diabetes, this specific gravity may be raised by the presence of sugar to 1030, 1035 or even 1045. The urine is pale yellow in colour, it is sweetish in odour, and of sweet taste. The uric acid is sometimes below normal; the urea is sometimes increased.

Acetone, Diacetic acid and Oxybutyric acid are commonly found in diabetic urine. These are generated by carbohydrates, proteins or fats taken with the diet.

2. There is unappeasable hunger and thirst. The increase of thirst is due to the excessive quantity of urine passed, causing an immense loss of fluid from the system. The unappeasable hunger is due to the fact that the system cannot assimilate the whole quantity of food ingested into the stomach, especially the carbohydrate food. The food that is assimilated, is more rich in protein than usual, but as food rich in protein increases the oxidation process, so there is craving for more food.

3. Indigestion is usually present, and this is due to ingestion

of greater quantity of food, which puts more strain on the digestive system. There is constipation with occasional diarrhoea.

4. There is emaciation, also loss of weight and strength.

5. A certain amount of sugar is excreted through the skin in Diabetes, and the skin seems to be dry and shrivelled up. There is an itchy sensation and tendency to boils, eczema, pruritus and xanthelasma in the early stages of the disease ; carbuncle and gangrene are found in the later stages.

The nervous system is very much affected in many cases. Peripheral neuritis is common in Diabetes. Neuralgia is more common. Even melancholia or mania may develop.

7. Changes in the eye are very common. There develops a sort of defective accommodation causing Presbyopia or soft Cataract. Optic atrophy, Retinitis and Amblyopia may also develop.

8. In severe cases, Acetone bodies are found, and may accumulate in the blood causing coma.

9. Pulmonary Tuberculosis is usually uncommon in elderly people. But in Diabetic cases, the tissue resistance is greatly lowered, consequently, the patient gets susceptibility to Tuberculosis which is one of the gravest complications of the disease.

Treatment.—Medicinal—Opium. In former days, Opium in the form of Codaine was the most commonly accepted therapeutic agent in the treatment of Diabetes. The use of Opium is still in vogue now. Codaine Phosph is given from $\frac{1}{2}$ grain to 6 grains.

Insulin.—The active principle (hormone) of the Pancreas which plays an important part in the carbo-hydrate metabolism of the human body. It is not a permanent cure for diabetes, it can be administered orally, but is mostly given hypodermically, with carefulness and precision, as an overdose may cause violent symptoms. The dietary during Insulin treatment should be very strictly regulated. But in the treatment of diabetic coma, acidosis and diabetic gangrene, Insulin is of much value. Tripsogen has proved highly efficacious in Diabetic cases. A very strict restriction

of diet is not necessary with Tripsogen. The carbo-hydrate tolerance is raised rapidly in the patient. It furnishes a means of regulating the impaired function of the Pancreas, also rebuilds and restores it to its normal condition.

Dietetic.—To regulate the diet of a diabetic patient, the process of guarding against Acidosis and increasing the Carbo-hydrate tolerance in the diet are the two chief factors that are to be looked into very carefully.

Acidosis means a disturbed relation between the acid and the basic elements of the blood in which the relative increase of Hydrogen-ion concentration is effected at the expense of the basic elements. The constant reaction of the blood is maintained by the peculiar reaction of the Acid Sodium Phosphates and Sodium Bicarbonate present in it. The Sodium Bicarbonate (*i.e.*, the "Alkaline reserve" as it may be called) present in the blood, is the chief agent in maintaining the amount of Hydrogen-ion concentration necessary for maintaining health. So long as the alkaline reserve is present in the blood in sufficient concentration, the addition of acids does not materially affect the alkalinity, neither it raises the acidity. Acidosis occurs as a result of accumulation of the various acid materials, and exhaustion of the basic elements of the blood.

In diabetic patients, or in persons kept under a condition of diet low in carbo-hydrates and very high in fats, "Keto-Acids" are found in the blood. They are excreted by the Kidneys in the urine as aceto-acetic and beta-hydroxybutyric acids (of the Ketone group). This beta-hydroxybutyric acid is produced by reduction of aceto-acetic acid. This condition is called "Ketosis". Those compounds that give rise to aceto-acetic acid are called Ketogenic substances, and those that are converted into Dextrose are called Anti-ketogenic.

The afore-said acids are, as a matter of fact, caused as a result of incomplete combustion of fats in the body. This incomplete combustion of fats occurs unless at least one molecule of glucose is available for the final oxidation of two molecules of fatty

acids, in case where the fatty acid is in excess. To help the metabolism, *i.e.*, for the complete combustion of fats, sufficient quantity of easily oxidisable carbo-hydrates are necessary, the oxidation of two substances proceeding at the same time. The chief feature of diabetes is the failure of sugar oxidation in the system ; consequently the intermediate products of imperfect fat-combustion accumulate, and acidosis develops. So under these conditions, acidosis should be carefully guarded against, and the Carbohydrate tolerance in the patient should be increased. The supply of fats (ketogenic substances) should be regulated, and it should be given in the ratio 2 of ketogenic and 1 of anti-ketogenic. That is 2 molecules of fatty acids : 1 molecule of glucose (carbo-hydrates sufficient to produce 1 molecule of glucose) to effect the complete combustion of the fatty acids, bring the blood sugar to normal, prevent the leakage of sugar in the urine, and eventually increase the reasonable amount of carbo-hydrate tolerance in the patient.

Fasting may give very charming results by sudden disappearance of sugar from the urine of the patient for some time. But the effect is not very encouraging ; as the patient when continually fasting gets emaciated, develops cerebral anaemia and nervous exhaustion. If a lean patient whose supply of body fat is low, be allowed to fast, the energy that will be produced in his body, will be entirely due to the combustion of his body protein. This destruction of the body protein produces as much glucose as is caused by combustion of the protein ingested. These cases become sugar-free, and improve easily if they are supplied with carbohydrates, observing the "ketogenic balance".

Directions for the starvation treatment.—The patient should be starved until the urine is free from sugar for 24 hours, or the blood sugar is reduced to about 0.1 per cent.

During starvation, the patient should be given weak tea or coffee only, up to 48 ounces a day. The patient may be starved for 2 or 3 days or more, and the period should be determined by the condition of the urine and the blood so far as it concerns the presence of sugar in them.

The diet as suggested below may be given as such, or there may be some reasonable modifications according to the tolerance of the patient. As regards the amount of protein, fats and carbohydrates to be taken by the patient, much depends upon the results of frequent urine and blood examinations. The approximate amount of calories in the diet to be taken by the patient for 15 days after the urine is free from sugar is also mentioned in the list.

DAILY DIET FOR 15 DAYS AFTER THE URINE IS FREE FROM SUGAR*

1st day. (Amount of Calories—100)

Cream	. . . . .	2 dr.
Weak tea	. . . . .	20 oz.
Cabbage well boiled	. . . . .	2 "
Lettuce (raw)	. . . . .	6 "
Chicken or Fish soup (Chicken about 1 oz.)	. . . . .	10 "
Egg (Half boiled)	. . . . .	½ Egg.

2nd day. (Amount of Calories—155)

Cream	. . . . .	3 dr.
Weak Tea	. . . . .	30 oz.
Cabbage	. . . . .	8 "
Lettuce (Raw)	. . . . .	6 "
Egg (Hard boiled)	. . . . .	½ Egg.
Meat or Fish soup (Meat about 1 oz.)	. . . . .	10 oz.

3rd day. (Amount of Calories—300)

Weak Tea or Coffee (with cream)	. . . . .	30 oz.
Cream	. . . . .	1-½ "
Egg	. . . . .	1.
Lettuce (boiled 1 oz. Raw 7 oz.)	. . . . .	8 oz.
Cabbage (boiled)	. . . . .	4 "
Soup (Meat or Fish 1¼ oz.)	. . . . .	10 oz.

* This running list of diets has been prepared on the basis of the formula laid down in the amendments for Royal Army Medical Corps Training—1925, by command of the Army Council 14th September, 1926.

8th day. (Amount of Calories—100)

Weak Tea or Coffee	. . . . .	30 oz.
Cream	. . . . .	2 dram.
Cabbage (well boiled)	. . . . .	4 oz.
Lettuce (raw)	. . . . .	6 "
Egg (Half boiled)	. . . . .	1

9th day. (Amount of Calories—1050)

Egg	. . . . .	2
Tea	. . . . .	30 oz.
Cream	. . . . .	2 "
Porridge (Oatmeal $\frac{3}{4}$ oz. with butter $\frac{1}{2}$ oz., water $8\frac{3}{4}$ oz.)	. . . . .	10 "
Fat, Bacon or Mutton (cooked)	. . . . .	2 "
Lettuce (raw)	. . . . .	7 "
Meat	. . . . .	2 "
Fish (white)	. . . . .	3 "
Potatoes (boiled)	. . . . .	4 "
Cabbage (cooked with butter 1 oz.)	. . . . .	3 "
Cabbage (boiled)	. . . . .	4 "
Butter	. . . . .	1 "
White bread	. . . . .	1 slice

10th day. (Amount of Calories—1320)

Egg	. . . . .	3
Fat Bacon or Mutton (cooked)	. . . . .	3 oz.
Fish (white)	. . . . .	4 "
Meat	. . . . .	3 "
Potatoes (boiled)	. . . . .	5 "
Cabbage (cooked and boiled)	. . . . .	8 "
Butter	. . . . .	2 $\frac{1}{2}$ "
Lettuce (raw)	. . . . .	7 "
Bread (white)	. . . . .	1 slice
Tea (with 2 oz. cream)	. . . . .	20 "
Clear broth	. . . . .	10 "

11th day. (Amount of Calories—1580)

Egg	.	.	.	.	.	.	.	3
Fat bacon or Mutton (cooked)	.	.	.	.	.	.	.	6 oz.
Meat	.	.	.	.	.	.	.	3 "
Fish (white)	.	.	.	.	.	.	.	3 "
Potatoes (boiled)	.	.	.	.	.	.	.	6 "
Lettuce (raw)	.	.	.	.	.	.	.	7 "
Cabbage (cooked and boiled)	.	.	.	.	.	.	.	9 "
Butter	.	.	.	.	.	.	.	4 "
Tea	.	.	.	.	.	.	.	20 "
Clear Broth	.	.	.	.	.	.	.	10 "
Porridge (Oatmeal $\frac{3}{4}$ oz., with $1\frac{1}{2}$ oz. butter)	.	.	.	.	.	.	.	.
Cream	.	.	.	.	.	.	.	3 oz
White bread	.	.	.	.	.	.	.	2 slices

12th day

Same as on 11th day.

13th day. (Amount of Calories 1820)

Egg	.	.	.	.	.	.	.	3
Porridge (Oatmeal 1 oz. with $1\frac{1}{2}$ oz. butter)	.	.	.	.	.	.	.	.
Fat Bacon or Mutton (cooked)	.	.	.	.	.	.	.	2 oz.
Meat	.	.	.	.	.	.	.	3 "
Fish (white)	.	.	.	.	.	.	.	3 "
Cabbage (boiled)	.	.	.	.	.	.	.	11 "
Lettuce (raw)	.	.	.	.	.	.	.	10 "
Potatoes (boiled)	.	.	.	.	.	.	.	6 "
Clear broth	.	.	.	.	.	.	.	10 "
Tea	.	.	.	.	.	.	.	20 "
Cream	.	.	.	.	.	.	.	2 "
Butter	.	.	.	.	.	.	.	4 "
Salad Oil	.	.	.	.	.	.	.	1 "
White bread	.	.	.	.	.	.	.	2 slices

14th day

Same as on 13th day.

15th day. (Amount of Calories -2200)

Egg	3
Porridge (Oatmeal $\frac{3}{4}$ oz. with butter)	
Fat Bacon or Mutton (cooked)	3 oz.
Meat	3 "
Fish (white)	4 "
Cabbage (boiled)	7 "
Potatoes (boiled)	6 "
Lettuce (raw)	10 "
White Bread	2 slices
Clear broth	10 oz.
Butter	6 "
Tea with Cream	20 "
Salad Oil	1 "

Patients belonging to different nationalities such as the Hindus (especially "Jains"—a special sect among the Hindus) who have some prejudice against taking meat, or do not like meat or fish, may take cheese, in quantity sufficient to yield an equal amount of caloric to that which is obtained from the meat or fish as mentioned under the chart for each day's diet.

Psychological.—The treatment of Diabetes is more of dietetic, psychological and physical than of medical. We know that the power of the body to oxidise carbohydrates is lessened by emotion; so the patient should be advised to seek for a quiet and comfortable life.

Exercise.—Sugar that is taken, is absorbed as glucose, and is lodged in the system as glycogen in the liver, and in the interstices of the muscles. It remains there as reserve energy, and is transformed into kinetic energy when so required. Out of the whole amount of sugar that has been assimilated into the system, the quantity that will go to help the constructive and rejuvenating functions, may be called the "Constructive Sugar" which will remain as glycogen, to be utilized when required. But the amount of sugar that is in excess—"Destructive sugar," and could not be utilized as

an useful agent in the construction of tissues, becomes an effete material ; it works as a toxin in the system, and must have its way out. It will come out with the urine and perspiration.

Regular and systematic physical exercise burns up this destructive sugar lodged in the interstices of tissues. To start with, proper exercise of the individual big muscles and groups of small muscles serves the purpose all right. Later on, groups of small muscles as well as individual big muscles may be utilized for the purpose.

As the tissue resistance in diabetic patients is much lowered, such patients should be advised to avoid special habits in life, and particularly those physical exercises that may cause cuts and bruises. Some recommend walking to be the best of all exercises for the diabetic patients. No doubt walking serves the purpose very well ; but it usually takes a long time, and the feet are liable to be injured, causing corns or blisters which help the septic germs to get access into the body, thereby giving rise to cellulitis etc. Moreover except the lower limbs, all the other parts of the body are not worked satisfactorily ; so the toxin that has been lodged in the other big muscles of the trunk and the upper extremities, is not excreted in a systematic way. The best form of exercise for a diabetic patient would be regular breathing exercises, also special movements of the trunk, and those of the upper and lower extremities also.

Exercises.—A diabetic patient should always take exercises in a big open space, where there is ample fresh air containing plenty of oxygen.

Breathing Exercises.—The following exercises are recommended :—

Group I.—Exercises Nos.—39, 33, 34, 35, 21.

Group II.—Exercises Nos.—3, 4, 5, 44.

Group III.—Exercises Nos.—32, 14, 9, 15.

Group IV.—Exercises Nos.—17, 18, 19, 19(a), 10, 10(a), 27, 42, 42(a).

To start with, the patient should practise the first group of exercises for about a fortnight. Then in addition to the first group, the second group should be attempted for another fortnight. Then as soon as he improves, and gains some strength, he should go in for all the three groups together. To improve particularly the Digestive system, Group IV should be practised in addition to the other groups.

The number of movements.—Each figure should be started with the minimum number that could be performed without feeling tired, and may be increased up to the maximum number mentioned under each exercise.

Where the patient is fatty and flabby, his heart is comparatively weak, and only one sound is usually found to be distinct on auscultation. Breathing exercises should be advised in the beginning. Gradually the number of movements (breathings) should be increased up to a limit when the body will perspire freely in hot weather, or the skin becomes hot in cold weather, after the breaths being taken in vigorously.

The number of trunk bendings in Exercises No. 9 should not be increased very much as it will tell upon the heart. It should be increased gradually. Those fat subjects will improve, and the two different heart sounds will be distinct in course of 4 or 5 months when comparatively more strenuous exercises (Figures Nos. 14 and 15) may be practised. When the patient can perform 25 movements of Exercise No. 15 without being tired (the heart beats not being more than 120 to 130 per minute) after that exercise, he may start running—firstly, slow “jog trot” for nearly three months. The distance being increased very gradually, then regular running with moderate speed should be tried. If the heart beats becomes more than 130 per minute after 25 movements of exercise No. 15, the former group of exercise should be continued for a longer period, before it is attempted.

GOUT

Gout.—It is a disease of the general metabolism of the body, and is a form of acute arthritis of small joints in which the deposit of crystalline sodium biurate in joints is the exciting cause.

Causes.—Heredity plays a very important part in the causation of Gout. Descendants of a gouty family are liable to this disease at a comparatively early age and with some slight exciting cause. It is more common in men than in women, and in the middle-aged and old than the young. People used to take large quantities of rich, highly nitrogenous food and alcohol, are more easily affected by this disease. Sedentary habit is one of the important causes of gout. Irregularity in life, also too much worry and anxiety are the chief causes of this disease. It is often associated with other constitutional diseases such as obesity and diabetes. Exposure to chill becomes one of the exciting causes of Gout.

Morbid Changes.—The protein molecule of the food stuff taken, is disintegrated by the action of the digestive anzymes of the gastro-intestinal tract into amino-acids. These amino-acids are the final building materials for the muscular structure of the body. The amino-acids are absorbed from the intestinal tracts into the blood stream. With the blood stream, they reach the various tissues of the body which utilize portions of these amino-acids, also reject those that are not required for re-building purpose, and those that may be liberated into the tissues themselves by the breaking down of the tissue proteins. These are now split into two portions, one of which is excreted as urea, and the other, the remainder of the amino-acid molecules is oxidised to produce energy. For want of proper exercise, the latter is not oxidised. It is retained in the system as insoluble Sodium Biurate in the lymph spaces, and in other tissues where the circulation is comparatively slow. The Biurate of Soda is deposited in the joints and their neighbouring ligaments. It may get deposited in the liver or in the pyramids of the kidneys.

Symptoms.—Almost always, the first symptom is manifested by an inflammation in the metatarso-phalangeal joint of one great toe. Sometimes the attack is precoded by marked constipation, mental depression, disturbed sleep, gastralgia, vomiting, scanty urine concentrated and loaded with urates. After these symptoms, in a day or two usually the patient is awakened in the early morning hours with pain in the great toe. He may get a chill or even a rigor. The pain lasts for some two or three hours, after which the patient finds his great toe red and swollen also very tender; the veins round the joint are slightly prominent and distended. During the day, the symptoms abate to an extent, but along with the advent of the night the symptoms reappear. The local troubles disappear in the course of 4 or 5 days, or it may last for a fortnight. Then the skin disquamates, and it assumes its normal condition. In milder attacks, disquamation may not occur. Along with the local symptoms, the patient gets fever with temperature ranging from 101° to 102° , accompanied with gastric troubles, loss of appetite, nausea, etc.

These gouty attacks may recur in course of an interval of 6 months or a year; and the trouble gradually becomes chronic in nature. The joint remains swollen and deformed. If properly treated, the symptoms may be much relieved.

The more chronic form of the disease often begins with small round nodules round the nuckles.

If small joints of the toes and fingers are first affected, in the long run gouty deposits may be lodged in all the joints of the extremities. The shoulder and the hip joints are very rarely affected. The foot of a chronically affected case, may get fixed as in Talipes. The knee or the elbow if affected, may get into a chronically flexed and fixed position. White deposits of some substance called "Tophi" are occasionally found to lie close under the skin which look white, thin and shining. Later on the skin may give way, and this creamy Tophi escapes through the rent in small quantities at a time. Though rarely,

suppuration may take place round the deposit ; when this happens, the elimination of the substance takes place early.

Irregular Gout.—When affected by Gout, many organs become chronically inflamed, and manifest functional disorders. Such inflammations may take the forms of Gastric and Intestinal catarrh, Bronchitis. Conjunctivitis, Iritis, Gouty Urethritis, Phlebitis, and inflammation of some nerves causing Neuritis. Granular Kidney may follow Chronic Gout. There may be Chronic Eczema. Arterio-sclerosis is a common sequela of Chronic Gout.

Treatment.—The chief aim in the treatment of Gout is to prevent the accumulation of Urates in the system, and to provide facilities for their excretion by the natural channels. These can be attained by suitable diet, systematic exercise and massage.

Regulation of Diet.—Food should be taken in moderate quantities. Food very rich in protein and too much sweets, alcohol, malted drinks, chocolates, brains, sweet breads, liver and kidneys should be strictly avoided. The patient should drink plenty of water when the stomach is empty.

Medical Treatment.—The main principle is to promote the free action of the bowels. Saline purges may occasionally be given. Potassium and Lithium Salts should be administered, as Potassium and Lithium Urates are more soluble than Sodium Urates. Lithium Citrates may be given from 5 to 10 grains dissolved in plenty of water. Residence in Spas does a lot of good in chronic Gout.

In an acute attack, the following pill may be of great value :—

Re.,

Ext. Colchici Acetici	.	.	.	.	gr. ½.
Pulv. Ipecacuanha Co.	.	.	.	.	gr. 1.
Ext. Colocynthis Co.	.	.	.	.	gr. 1
Ext. Gentian	.	.	.	.	q. s.

Make one such pill—one to be taken thrice daily.

Local application of Betul Oil gives much relief. It should be soaked in a piece of cotton wool and applied on the affected

part, and on the top of it, some guttapurcha tissue or oil silk should be placed, finishing it with a light bandage. The affected foot should be kept raised, and supported on a soft pillow.

Diet.—Special care is to be taken regarding the diet. It should at once be restricted to milk and starchy food. But in chronic cases, the diet may be liberal, but never rich. Meat specially red ones and an excess of sweets must be omitted in the diet. The patient should be allowed to drink water in plenty.

Exercise.—The patient should go in for plenty of strenuous exercises regularly as soon as the acute symptoms are over. But the amount of exercise taken, should be according to the condition of the heart. With vigorous exercise, the general metabolism of the system is improved. In the sub-acute stage, the foot should be massaged, and the other parts of the body should be exercised vigorously. The object of massage here is to try to promote resolution and reabsorption of the gouty nodules. Special abdominal exercises should be encouraged to promote and improve digestion.

Exercises recommended.—If the patient has got a weak heart, Exercises Nos.—33, 34, 34(a) 35, 39, also Exercises Nos. 5, 3, 4, should be practised in the beginning; and massage should be given to the joints that have been the cause of the trouble. Gradually as the heart improves, Exercises Nos. 38, 21, 40 should be attempted for nearly a fortnight. Later on, Exercises of a more vigorous type such as Nos. 14, 15 and 16 may be practised and continued permanently.

To promote and improve the digestion, the following Exercises should be practised :—Exercises Nos. 9, 10, 18, 22, 23, 25, 42, 42(a), 26 and 27.

OBESITY

In Obesity, there is general lowering of the oxidation of fat in the tissues. As a consequence, the process of fat accumulation in the body is unusually increased. The accumulation is particularly increased round the hips, the abdominal walls and the mammary regions. Fat also accumulates round the heart, kidneys and in the mesentery.

It is not easy to draw a demarcation line between the conditions in a person having a good all round development and an abnormal deposition of fat. But a man of medium height might be considered to have normal weight if he weighs 12 stones and a woman 10 stones.

Types of Obesity.—(a) Deposition of fat all over the body.

(b) Deposition of fat especially at the girdles and the mammary regions.

Causes :—1. Exogeneous.
2. Endogeneous.
3. Hereditary.
4. Endocrine.

Exogeneous.—Ingestion of too much fat into the body through food materials rich in fat.

Endogeneous.—Want of sufficient physical exercise preventing proper combustion of extra fat in the body.

Hereditary.—Hereditary tendency to Obesity is very common in families.

Endocrine.—Defects in the development and a consequent want of activity of the glands of internal secretion such as the Pituitary, Thyroid, Suprarenal, Testes and Ovaries.

In Pituitary deficiency, the patient gets accumulation of fat in the girdle and in the mammary regions. There are scanty growth of hair, soft and delicate skin, small stature, small tapering and narrow fingers, sluggish and retarded mentality. There

are sex characteristics of the opposite sex. The sex organs are very small, there is want of sexual desire and power, leading to impotence. The blood pressure is low, the pulse is usually slow. The patient feels fatigued after the slightest exertion. There is general inactivity.

In Thyroid deficiency, the fatness is all-round. The growth of hair is very scanty. The hair gets brittle, the outer third of the eye-brows gets very thin. The skin is rough and thick. The general development of the body is poor, and is stunted. The fingers are club-like. There is mental dullness. There is gastro-intestinal trouble, causing occasional constipation. The teeth are poorly formed, there is often delayed dentition. The blood pressure is low, and the heart action is slow. The temperature is often low.

In Adrenal over-activity, the patient along with the obesity assumes the characteristics of the opposite sex. There is high blood pressure. The child is developed very early *i.e.*, prematurely.

Symptoms.—1. As a rule, fat people get easily tired. All the movements, even the ordinary ones are slow and difficult, owing to excessive body weight.

2. **Breathlessness.**—due to rapid onset of fatigue.

3. **Easy and profuse perspiration.**—partly due to the excessive heat, which is formed in the body by the increased activity of the muscles required to move the heavy body weight, and partly due to the excessive amount of subcutaneous fat which acts as a sort of non-conductor, thereby retaining the body heat.

4. The patient complains of a feeling of tightness in the chest. This is due to the accumulation of fat outside the heart and in the connective tissue between the fibres of the Heart muscle.

5. There is Cardiac Hypertrophy, because the work of the heart is increased. This is due to the increased amount of blood that the heart has to pump out more than in normal condition.

6. Due to the slowness of the circulation, the tissue vitality is lowered. Consequently cellulitis easily develops in fat persons.

Treatment.—The chief aim to stop obesity, and reduce the physical condition to a normal one, is to guard against the intake of fat of any quantity and foods containing it, also farinaceous foods, excessive quantities of potatoes, sugar and vegetables containing too much starch in them. Alcohol should be religiously avoided.

Pure and simple cases of obesity are not very common. Usually we find in these persons many other grave troubles such as Gout, Rheumatism, Fatty heart, Cardiac hypertrophy etc.

In cases of adiposity which has been acquired recently, and is ascribable to rich and fatty diet, also want of physical exercise, strict abstinence from fatty food should be observed. Taking of boiled lean meat three times a day should be recommended. During the intervals, the patient should sip from half to one pint of hot water four times a day. After 6 weeks, vegetables and small quantity of starchy food may be added, and the following list of diet would be an ideal Recipe.

Breakfast.—	Egg	...	...	1
	Bread	...	...	1 oz.
Lunch.—	Egg	...	...	1
	Green Vegetables	...	...	8 oz.
Dinner.—	Lean meat	...	...	3 oz.
	Green Vegetables	...	...	8 oz.

None of the articles of food should be taken in the fried form, and milk or oils should not be used in cooking the vegetables.

Plain water may be drunk freely. Gradually the normal diet may be adopted. During the normal diet period, it should be observed that sufficient protein is present in the food, in order to maintain the nitrogenous metabolism. The anti-ketogenic ratio between the fats and carbohydrates in the food should also be carefully observed.

Free sweating is urgently needed in cases of obesity.

Periodical administration of saline purgatives during the period of meat diet course is also recommended.

Excepting occasional purgatives (saline) and the use of aperient waters, other medicines are not of much use. In cases of defects in the glands of internal secretion causing obesity, Thyroid Gland extracts may be tried with success. Thyroid extract 9 grains is equal to 1000 calories. That is 9 grains of Thyroid extract can reduce an amount of body weight which is caused by an intake of diet giving 1000 calories. These Thyroid extracts stimulate all metabolism, and as a result, profuse oxidation takes place in the system. So during the administration of this drug, the amount of the protein intake should be increased to balance the increased protein metabolism. The action of the heart is accelerated, and the blood pressure is raised during the "Thyroid treatment." In cases of abnormally high blood-pressure "Thyroid treatment" is contra-indicated.

In cases of Infantile obesity, along with the Thyroid extract treatment Pituitarin extract should be administered.

In cases where the sexual appetite is less, or in obesity with amenorrhoea the use of sexual hormones (Testes or Ovary as the case may be) can be used with advantage.

The use of the glandular products should always be administered under strict medical supervision.

Physical Exercise is strictly required in obesity cases. Systematic and gradually increased exercise of an active type, and later on strenuous exercises are recommended.

To enhance the combustion of the extra tissue-fat existing in an obese patient, exercise should be the first step in the treatment of obesity. Oxygen is the chief agent in the combustion of fat in the tissues. So deep breathing exercises should preferably be taken. For this purpose, special breathing exercises such as following are recommended :—

Exercises.—

Group I.—Ex. Nos.—34, 34(a) 33, 35, 5, 44, followed by a brisk walk starting slowly, for a fortnight.



Mr. Nripendra Nath Sawoo.

Had been ailing from Cardiac Hypertrophy and obesity always too tired to enjoy life at 36—made an immense improvement in 90 days, under the treatment of the author—Measurements at the waist came down from 48½ inches to 38 inches—weight from 15 stones 2 lbs. to 13 Stones 2 lbs.

(Facing page 224)

Group II.—Group I and Ex. Nos.—1, 2, 3, 4, 9. Then brisk walk followed by “jog trot” for a fortnight.

Group III.—Groups I and II, also Ex. Nos. 10, 26, 23, 32. Then brisk walk and “jog trot” for three weeks.

Group IV.—Groups I, II, and III, also Ex. Nos. 20, 17, 18, 19, 62, followed by the same procedure as after the 3rd Group for three weeks.

Group V.—The four groups together with Ex. No. 27, also running with gradually increased speed, taking care of the heart, and avoiding exhaustion.

Massage.—Vigorous massage of the whole body regularly done, helps to reduce the fat in an obese person.

RICKETS

It is a constitutional disease of a chronic type with defective nutrition. It occurs in children within the first three years of life. Sometimes it occurs later. The changes that are especially peculiar in Rickets are manifested not only in the bones, but in the ligaments, muscles and the nervous system.

Causes.—1. Faulty hygiene, especially congestion and want of sunlight.

2. Defective dietary—Improper food, especially too early administration of starchy foods. So it is common among the poorer classes who cannot get fatty foods such as cream etc., or sufficient amount of protein. Feeding the babies with artificial foods wanting in Vitamin A is also one of the causes of Rickets.

3. It is not a hereditary disease.

4. Both male and female children are equally affected by this disease.

Morbid Anatomy.—The pathological changes are mostly manifested under the periosteum and at the ends of the long bones, especially in the neighbourhood of the epiphyses; also at the margins of the flat bones. The epiphysal cartilage which in the normal condition is only a very thin plate, becomes unduly thick, and the bones become soft, so the margins end in projections, and they curve according to the direction and degree of pressure on the soft bones. Along with the bony changes, there comes on enlargement of the liver, spleen and occasionally of the Kidneys and the Lymphatic glands.

In the bones, the special changes that take place are excessive absorption of pre-existing bony tissue and elaborate formation of Osteoid tissue. The Epiphysis usually joins the Diaphysis (the shaft of the long bone) too early, and stunted growth results. The muscles and ligaments become flabby.

Symptoms.—The disease usually attracts the attention of the parents between the 6th and the 12th months of the child's life.

The usual complaint being that the child cannot walk. It cannot sit up, and there is delayed dentition. The child dislikes to cover its limbs at night. It constantly kicks the bed clothes, perspires profusely about the head and neck. But the rest of the body is usually dry during sleep.

The remarkable symptoms are :—

The ends of the long bones at their Epiphyses are distinctly enlarged. At the junction of the ribs and the costal cartilages a series of nodules (Rickety rosary) become distinctly prominent.

The Fontanelles close late, they remain open even after the 2nd year, whereas normally, they close between 15 or 20 months.

Both the parietal and frontal eminences become prominent. Consequently the skull becomes square-shaped.

There may be pigeon chest with the sternum protruding or sunken and grooved. This is a result of the collapse of the lung caused by frequent attacks of bronchitis—thus preventing the expansion of the chest sideways.

There is irregular curvature of the spine. A peculiar deformity manifests itself in the lower extremity, and especially bow legs (*genu verum*), knock knee (*genu valgum*) or flat foot etc. occur.

The disease usually ceases to develop any more symptoms after 3 or 4 years from the child's birth. But the deformities that are left, remain more or less permanent.

Prognosis.—Before the bony changes peculiar to this disease take place, it is amenable to treatment. In the majority of cases where the symptoms are not very marked, there is every chance of complete recovery, no defect being practically left in after life of the patient. The bones become hardened, and the limb ultimately becomes perfectly straight. Death is due to several gastro-intestinal or respiratory complications,

Treatment.—The main principles of treatment in cases of Rickets are :—

1. To prevent the premature ossification of bones especially the changes at the ends of the long bones and of the ribs.
2. To prevent the formation of "Rickety rosary" and pigeon chest.
3. To prevent Lordosis.
4. To prevent the formation of Genu Verum or Genu Valgum (bending of the legs).

To prevent the usual changes in the bones, the steps that should be taken are :—

1. Attention should be paid strictly to the diet of the patient.
2. The general hygienic condition should be improved.
 - (a) The child should live in a well-ventilated room with healthy surroundings.
 - (b) The child should be regularly taken out in the fresh air.
 - (c) The clothings should be light but pretty warm (to avoid chill).

3. **Diet.**—The intake of Carbo-hydrate should be very much restricted. The child's diet should be rich in Vitamin A, animal fats and protein.

If the mother be of a very delicate constitution, nursing should be stopped. Cow's milk preferably diluted with $\frac{1}{3}$ or $\frac{1}{4}$ portion of water (added) should be given. Lime water and a little cream should be added to the milk.

After the first year, the child should be given meat juice, chicken broth, fresh vegetable soup—such as of cauli-flower, beet etc.

Medicine.—Cod Liver oil is of much value. Syrup Feri Phosphates is also useful.

To prevent "Rickety rosary", regulation of diet and hygiene as stated above may be highly useful.

To prevent pigeon chest, frequent occurrence of Bronchitis should be checked by medicine and hygienic measures as well as regulation of diet. Proper aeration of the Lungs of the child is advisable. Passive movements of the body of the child imitating the following exercises, should be performed by the Physical Instructor.

Exercises Nos.—17, 18, 34, 34(a).

When the patient is cured of Rickets, and gradually advances towards adolescence, he should be encouraged to indulge in open air sports and breathing exercises.

The special breathing exercises recommended, are as follows :—

Exercises Nos.—5, 44, 33, 35, 36, 9.

To prevent Lordosis, the child should not be allowed to sit on its buttocks so long as the bones are pretty soft, as in so doing, the weight of the upper part of the trunk and especially of the head which is as a matter of fact too heavy for the child droops forwards ; the child, to maintain the erect posture in sitting, bends his loins making the concavity of the spine prominent behind. In this way a defective development of the back-bone is acquired.

To prevent the deformity of long bones, especially of the Lower Extremity so long as the bones are soft, the child should by no means be allowed to walk. When a certain amount of curvature of the bones is manifested, it can be prevented by fixing a splint on the side of the leg, the lower ends of the splint projecting some 3 or 4 inches beyond the foot. The splint should be removed at night when the child will sleep.

For special Exercise Treatment in case of deformity remaining after the cure of Rickets, refer to diseases Genu Verum and Genu Valgum described under surgical Chapters.

ANÆMIA

The chief characteristic of Anaemia is an alteration of the natural colour of the skin and the mucous membrane which is commonly ascribed to poverty of blood.

In normal condition, the skin of the white people is of pink colour, and the mucous membranes are of deeper hue due to the blood circulating in their vessels.

In anaemia, the skin assumes a waxy whiteness, and the mucous membranes assume a pale pink colour ; while in the darker races, the complexion becomes ashy pale, and the mucous membranes become whitish.

Anaemia is classified as follows :—

- 1 Primary anaemia—(a) Chlorosis.
(b) Pernicious anaemia.
4. Secondary anaemia.

Causes.—

Primary Anaemia—Chlorosis or green sickness occurs frequently in young females about the time of puberty.

Pernicious anaemia—occurs in adults of both sexes.

The change in primary anaemia depends on the condition of blood itself ; but the change is due either to the toxin working upon the organs where the blood corpuscles are formed, also the bone marrow in the long bones or to the blood destroying agencies.

In Secondary Anaemia the causes are :—

1. Haemorrhage—(Acute), such as due to :—
 - (a) Incised or lacerated wounds.
 - (b) Gastric (gastric ulcer).
 - (c) Intestinal (Typhoid).
 - (d) Rectal (ulceration), piles.
 - (e) Profuse menstruation.
2. Profuse and continued discharge of pus from old sinuses, Leucorrhoeal or other discharges in women.
3. Deficient inestion of food materials due to some sort of obstruction (stricture) in the Oesophagus, or starvation,

4. Deficient assimilation of food as in diseases of the digestive organs, or defective assimilation of food due to severe acute diseases e.g., Pneumonia, Pleurisy, Typhoid etc., or chronic diseases such as Phthisis, Aortic regurgitation or other valvular diseases of the heart in children.

5. Bad hygienic condition, over-work, worry.

6. Intestinal worms, such as "*Ankylostoma duodenale*" causing abstraction (sucking) of blood from the intestine of the patient.

Symptoms.—The redness of the blood depends mainly upon the injection of sufficient quantity of oxygen into it, transforming the methaemoglobin into haemoglobin which is practically effected by the inhalation of a sufficient amount of pure air through the Lungs. The blood corpuscles becoming deficient in number, fail to imbibe sufficient quantity of this colouring matter (Haemoglobin) into the blood, through this process. The general metabolism is lowered, and several other symptoms such as the following make their appearance.

1. The skin is pale, and waxy-looking. In cases of recent and profuse haemorrhage, the skin becomes almost white. In Pernicious Anaemia, the skin becomes yellowish. In Chlorosis, the complexion becomes slightly greenish or earthy. The lips become pale pink, the mucous membranes in other parts of the body also assume pale pink hue.

2. Due to deficiency of oxidation of tissues, there is diminished metabolism, and consequently diminished muscular strength; the muscles get tired easily. The capacity for mental work is also diminished. There is ringing in the ears, and giddiness is felt on suddenly rising from a lying or sitting position; also occasional attacks of faintness, and headache occur.

3. Due to lack of proper nutrition of the heart, there occurs palpitation on slight exertion. The hands and feet are cold due to weak circulation.

There is systolic murmur which is heard loudest when the patient is in a recumbent position, but disappears when the patient moves about a little.

4. There is breathlessness due to the deficient intake of oxygen which fails to supply sufficient amount of Haemoglobin to the blood.

5. As a result of insufficient nutrition of the general constitution, the power of digestion is impaired. Dyspepsia makes its appearance, and aids the failure in the general nutrition of the body.

6. There is deficient or even stoppage of menstruation in women.

Treatment.—The principle aim of the treatment should be :—

1. To remove the cause.
2. To improve the general nutrition and metabolism of the body by :—

(a) Restricted diet—sufficient and nutritive diet should be supplied. But it should always be administered by carefully observing the condition of the Digestive system, and according to the fat or lean condition of the patient.

(b) Taking steps to remove any constipation present.

(c) Relieving the special Symptom (poverty of blood) by putting special stress on the improvement of the respiratory capacity, by placing the patient in a healthy atmosphere, encouraging suitable and healthy exercises, and thereby helping the patient to enrich the colouring matter (Haemoglobin) of the blood corpuscles which supply vitality to every tissue, even those that are situated at the furthest proximity from the heart.

3. To help the patient to recuperate his strength by rest and diminished work.

Exercises :—

Group I.—To improve the chest capacity and the condition of the blood, by helping the blood in

enriching its hæmoglobin element ; also improving the the condition of the blood-forming agencies.—

Exercises—While in a sitting posture.—

The patient should undergo the following exercises :—

Exercises Nos.—1, 2, 3, 4, 5, 44, 33, 34, 34(*a*), 36, 32, 32(*a*), 32(*b*) for about a month, and then,

Group II.—Exercises Nos.—1, 2, 3, 4, 5, 44, (standing as usual) in addition to—

Exercises Nos.—9, 17, 40, 33, 34, 34(*a*), 36, 32, 32(*a*), 32(*b*).

Group III.—To avoid constipation (specially)—

Exercises Nos.—10, 20, 27, 42, 42(*a*) may be added to the chart, after the patient has undergone the exercises mentioned under Group II for about a month and a half. Special care should be taken to see that the patient does not get fatigued after the exercise. He should be advised to proceed very carefully.

In severe cases, prolonged rest in bed for 3 or 4 weeks is advisable. Treatment with tonics, change of climate and nutritious diet should be tried ; and after some appreciable improvement, physical exercises may be encouraged.

SCROFULA

By Scrofula is meant, the swelling of glands in different parts of the body of persons having Lymphatic diathesis.

Causes.—General debility and especially hereditary tendency to Lymphatic diathesis are the causes of this trouble. It is common in children and young adults, and is characterised by chronic inflammation of the Lymphoid tissues in the nose, throat and other parts of the body, especially the Lymphatic glands.

Tubercle bacilli are the chief agents in the causation of this trouble. Minute particles or scales of dried sputum of Tuberculous patients borne in the air, get into the air passages of those having Lymphatic diathesis, lodge into the mucous-membranes of their nose and throat, and give rise to inflammation. From there, the inflammation extends into the neighbouring Lymphatic glands. Any lymphoid tissue in the body may become the seat of tuberculous disease; the glands of the neck, especially the submaxillary and the glandulae concatenate (the chain of lymphatic glands situated at the posterior border of the sternomastoid muscle in the neck) are much more commonly involved than any other glands in the body. The axillary and inguinal glands are not infrequently affected.

The infection may also be carried along with the food, usually with the milk from tuberculous cows, and especially when the milk for the children is not boiled or pasteurised properly.

Diseases such as whooping cough, measles, nasal catarrh etc., sometimes sow the seed of infection of Tubercule bacilli in these cases.

Symptoms.—The patient usually suffers from obstinate bronchitis, laryngitis, sores in the eye or in the mouth. There is inflammation of the middle ear causing discharges through the ears.

There are occasional attacks of slight fever. The glands in the neck—the submaxillary and the concatenate are swollen. At first the disease manifests itself in a fleshy enlargement of

the glands, and look like simple chronic hyperplasia. The glands attain a very big size about 4 or 5 times that of the normal. When tuberculous infection takes place in the glands, the characteristic nodules can be seen under the microscope, but no change could be recognised by the naked eye.

Sooner or later, caseation of those affected glands follows. In cases that have a tendency to recovery, calcification of those caseous masses occurs, followed by fibroid thickening of the gland.

In some cases, suppuration occurs in the glands, and an abscess is formed. If left to itself, the abscess bursts, pouring out the caseating materials.

- Treatment.**—1. Palliative
2. Radical.

Palliative (treatment).—1. In the early stage, the patient should be placed in a healthy surrounding.

2. Sufficient and nutritious food especially fat, cream, cod liver oil etc., should be administered.

3. Tonics such as Syrup Ferri Iodide may be prescribed.

4. All sources of local irritation should be avoided.

Radical (treatment).—Surgical interference is necessary.

Exercise.—During the period when no abscess formed, exercises may be prescribed for improvement of the general constitution and the digestive organs, and to relieve constipation.

For improvement of the general constitution.—

Exercises Nos.—3, 4, 5, 44, 9, 14, 15, 18, 19, 19(a) and running, starting with a jog-trot.

For improving the digestive system.—

Exercises Nos.—9, 10, 10(a), 25, 32, 32(a), 32(b).

To relieve constipation.—

Exercises Nos.—10, 10(a), 27, 29, 42, 42(a).

Massage.—Massage may be applied on the body after the exercise. But the parts where those affected glands are situated should not be disturbed by massage.

CHAPTER IX
DISEASES AND INJURIES OF MUSCLES
MYOSITIS

It may occur under various circumstances.

Symptoms.—1. There is pain, sometimes aching pain and tenderness in the affected muscle. The pain may be extended to the other parts of the body due to the irritation of a nerve caused by the inflamed muscle, and resulting in Neuralgia. The inflammation may extend to the body of the nerve, giving rise to Neuritis of the nerve.

2. Swelling of the muscle.

3. Diminished elasticity—all movements both active and passive which stretch the affected muscle are painful and limited.

4. Irritating Symptoms—the inflammation sometimes causes Cramps or Tremors.

Types of Myositis.—

1. Simple Traumatic Myositis.
2. Over-fatigue of muscle.
3. Rheumatic Myositis.
4. Acute Suppurative Myositis.
5. Chronic Tuberculous Myositis.
6. Parasitic Myositis.
7. Syphilitic Myositis.
8. Myositis Ossificans.

1. **Simple Traumatic Myositis (*Acute*).**—It is caused as the result of a contusion or laceration of the muscle fibres, due to Trauma from some outside agent, or rupture of the fibres caused by overstretching of the muscles, resulting in a strong mechanical irritation. It is a plastic inflammation, there may be haemorrhage which heals up quickly, leaving a little fibrous thickening of the part.

Treatment.—Rest with application of some cooling lotion (*Latio Plumbi. Subacetat. Dil.*) or ice for about 24 hours from the time of the accident followed by fomentation and light massage. After the massage, the part should be covered with a piece of flannel.

On several occasions, inexperienced athletes with some common empirical knowledge, advise massage and application of some counter irritation immediately after the accident. There is great risk of an aggravation of symptoms, and the inflammation may result in suppuration.

As soon as the painful condition subsides, gentle active movements of the muscle are necessary; they produce an increased supply of blood to the muscle, and so replace the lymph removed by massage.

Chronic.—If the inflammation becomes chronic, the body of the muscle becomes shortened, and the substance of the muscle becomes replaced by fibrous tissue. The fibrosis may extend beyond the original lesion. If the inflammation lingers on for a very long time, and the muscle is very frequently irritated, a limited portion of the muscle undergoes change from fibrous to an ossified condition. Thus, in several veteran riders the upper portion of the adductor muscle tendon becomes bony.

Treatment.—In this type of chronic inflammatory Myositis—rest, fomentation and regular massage, especially friction and passive movements of the limb are necessary. Later on, when the painful condition subsides altogether, gentle active movements are useful.

2. **Over-fatigue of muscle.**—After too much exercise, the muscle gets fatigued. The fatigue is due to utilization of the substances available for the supply of energy to the muscle. There is formed an excessive amount of sarcolactic acid, as a result of combustion which accumulates as a waste product in the interstices of the muscle fibres. It causes irritation and inflammation to a certain extent. The inflammation may be so great as to cause suppuration in the muscle, resulting in a local abscess.

Treatment.—Rest and massage in mild cases. But if the inflammation be very acute and extensive, rest, application of Antiphlogistine and hot fomentations should be resorted to. After some improvement, local massage should be tried. When an Abscess is formed, surgical interference is necessary.

3. **Rheumatic Myositis.**—It is caused by exposure to cold in subjects having a Rheumatic diathesis.

Treatment.—Fomentation and rest. Internally a dose of Calomel followed by saline next morning will do a lot of good. After a day's rest, massage with an embrocation is necessary, using all manipulations, especially friction. The object of massage is to break up the products of inflammation, and encourage a reactionary process which promotes healing.

As soon as the sub-acute stage passes off, gentle active movements by way of exercise should be encouraged, and massage must be applied following the exercises. These exercises produce an increased supply of blood to the muscles affected, and the massage replaces the lymph removed by the exercise.

(4) **Acute Suppurative Myositis.**—It is due to some pyogenic infection either from within or without. From within as in Pyæmia or extension of the infection from some neighbouring septic focus *e.g.*, a sub-periosteal abscess, or from contusion or a sprain by auto-infection. From without, the infection may be caused by gunshot wounds, punctures by sharp instruments, gangrene, etc.

Morbid Anatomy—The pus that is formed, spreads up and down the muscular planes far and wide, and after the part is healed, great deformity caused by the cicatrix thus formed may follow.

Treatment.—Purely surgical.

5. **Chronic Tuberculous Myositis.**—It develops as a secondary consequence of a Tuberculous affection of the neighbouring bones of joints. Some chronic abscess may form in the muscles *e.g.*, Psoas Abscess.

Treatment.—Surgical interference is necessary.

6. **Parasitic Myositis.**—It is caused by the presence of *Trichina Spiralis* or of *Hydatid Cysts* in the muscle,

Treatment.—Surgical.

7. **Syphilitic Myositis.**—This sort of Myositis is generally found in the Tertiary period of Syphilitic cases. It is caused by a diffused sclerosis or a localised gumma in the muscle. The tongue and the sterno-mastoid muscles are more commonly affected. The diagnosis should be very carefully made, as it simulates tumours of the muscles, but the history and the "Wassermann reaction" report of the blood will throw a flood of light on the investigation.

Treatment.—A full course of syphilitic treatment should be adopted followed by massage and exercises similar to those as in Rheumatic Myositis.

8. **Myositis Ossificans.**—No treatment has been of any success up to the present day.

TUMOURS OF MUSCLES

(1) Primary Tumours of Muscles.

(2) Secondary Tumours of Muscles.

(1) **Primary Tumours of Muscles.**—These are growths namely Fibroma, Chondroma, Myxoma, Sarcoma and Angioma. Majority of these tumours start in the fibrous sheaths or muscles.

(2) **Secondary Tumours**—grow in the sheaths of muscles situated in different parts of the body and away from the original focus.

Treatment.—Surgical.

DISEASES OF THE SHEATHS OF TENDONS

The Sheaths of Tendons are lined by Synovial Membranes. The inflammation of these membranes are due to Trauma or Bacterial infection. They are as follows :—

(1) Acute Simple Teno-Synovitis.

(2) Acute Suppurative Teno-Synovitis.

(3) Chronic Simple Teno-Synovitis.

(4) Chronic Tubercular Teno-Synovitis.

(1) **Acute Simple Teno-Synovitis.**—It is often of a traumatic origin, following sprains or strains to which the subject is not accustomed.

Symptoms.—There is a puffy swelling caused by inflammatory changes in the tendon sheath. The tendon is tender on pressure, and is painful on movement.

Treatment.—In the first stage, during the first 24 hours following the injury—rest by immobilising the limb and cold applications are advisable. After 24 hours, hot fomentations and massage in the form of effleurage, friction, wringing and vibrations. Embrocations are useful.

(2) **Acute Suppurative Teno-Synovitis.**—It may be due to a punctured wound of the synovial sheath of the tendon, or the inflammation may extend to it from the surrounding tissues.

Symptoms.—The common variety of this class of inflammation is a whitlow. The suppuration may extend both up and down the sheath of the tendon. Sloughing may take place, and subsequent deformity due to extensive adhesions to the neighbouring parts may take place, causing disorganisation of the articulations close by.

Treatment.—Prompt surgical interference such as—Letting out of the pus with an incision and followed by dressing is necessary. After the wound is healed up, careful massage and passive and later on active movements of the affected part are the measures that should be adopted.

(3) **Chronic Simple Teno-Synovitis.**—

Causes.—It is a passive effusion of glairy synovial fluid into the tendon sheath. The fluid has the appearance of the albumin of the egg to the naked eye. It may be diffuse, causing an elastic and fluctuating swelling along the course of the tendon. There is a sort of creaking sound experienced during pressure. There is no tenderness or pain, but the part remains pretty hot.

Treatment.—At first, some counter-irritation and pressure are required. The application of "Scott's Dressing" is a very good treatment. If this gives no relief, surgical treatment by way of removing the synovial fluid, and washing out the cavity is required. If there be a cyst-like growth rather than a long extensive swelling, the best treatment would be puncturing the swelling, squeezing out the contents followed by application of pressure.

(4) **Chronic Tuberculous Teno-Synovitis.**—It occurs in two forms—

- (a) In the first type, the tendon sheath is lined by a thick oedematous granulation tissue causing a soft elastic swelling along the course of a tendon. The swelling is not so painful. It is tuberculous in origin. Suppuration may follow, and the neighbouring joint may be involved.

Treatment.—Massage is not advisable, Immobilising the part is essential, and pressure is to be applied, also general health should be attended to.

- (b) The second type is a sort of passive effusion into the synovial space, in which fibrinous materials get deposited, causing some thickening of its lining membrane. The fibrinous material gets very often detached, and by the movement of the part, the detached fragments of loose fibrin are moulded into shapes called "Melon-seed" bodies.

Treatment.—Rest of the part by application of splints and Scott's dressing. If no improvement is perceptible, surgical interference is necessary.

GANGLION

It is a cyst-like swelling on the tendon sheath, usually arising from the tendons of the thumb, index finger or the front of the wrist. The swelling contains a clear transparent jelly-like substance.

Causes.—It may be caused by chronic localised Teno-Synovitis, or the protrusion of the synovial membrane through an opening in the sheath of the tendon.

Treatment.—Rupturing the Ganglion by pressure. Sometimes this treatment is sufficient, but it may fill in again. Another treatment is surgical. It is by removing the cyst-like swelling completely with perfect asepsis.

In several ganglion cases, I have seen the protrusion disappearing automatically in course of six months or a year.

A Compound Palmer Ganglion.—Many melon-seed bodies could be found surrounding the flexor tendon of the wrist. Fluctuation could be felt beneath the annular ligament.

Treatment.—Scott's dressing and constitutional remedy is necessary. If this treatment fails, surgical interference is indicated. The melon-seed bodies and fibrous debris should be removed.

HERNIA

Hernia means the protrusion of some viscus of the body from its normal position, through an aperture in the walls of the cavity in which it rests. It is more common with the Abdominal viscera. But there may be Hernia of the Lungs or of the brain. In this publication we shall deal with Abdominal Hernias, and especially the Inguinal and the Femoral varieties which we usually come across.

INGUINAL HERNIA

Structure of an Inguinal Hernia.—It consists of a *sack* which is formed of a portion of peritoneum derived from the abdominal parietis, and the *contents* are the protruded viscera from the abdomen ; as a rule however only the small intestine or omentum is found to be the contents of the Hernia.

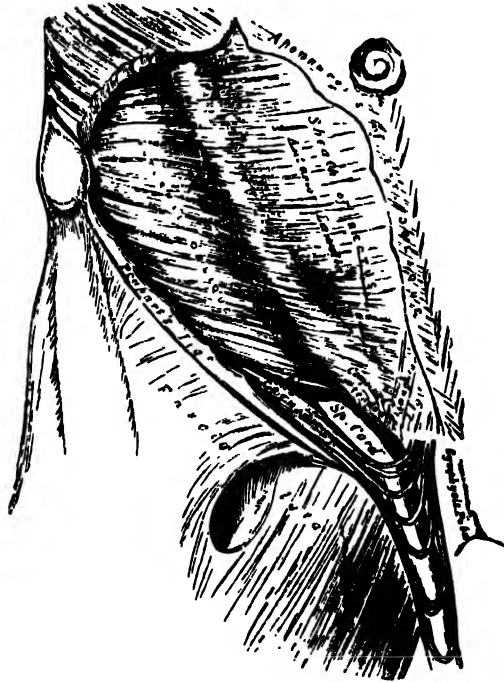


Fig.—Showing the Internal oblique and Cremaster muscles, also the spermatic canal.

The Inguinal Hernia makes its progress through the Inguinal Canal, and finally enters the scrotum in the male, and the Labia Majora in the female,

The *Inguinal Canal* through which the hernia makes its progress into the scrotum is the chief structure for study in a case of Inguinal Hernia. It is an oblique canal about an inch and a half long, running downwards and inwards parallel with and a little above the Poupart's Ligament. It begins at the Internal Abdominal ring, and terminates at the External Abdominal ring. There is one Inguinal Canal on each side of the body.

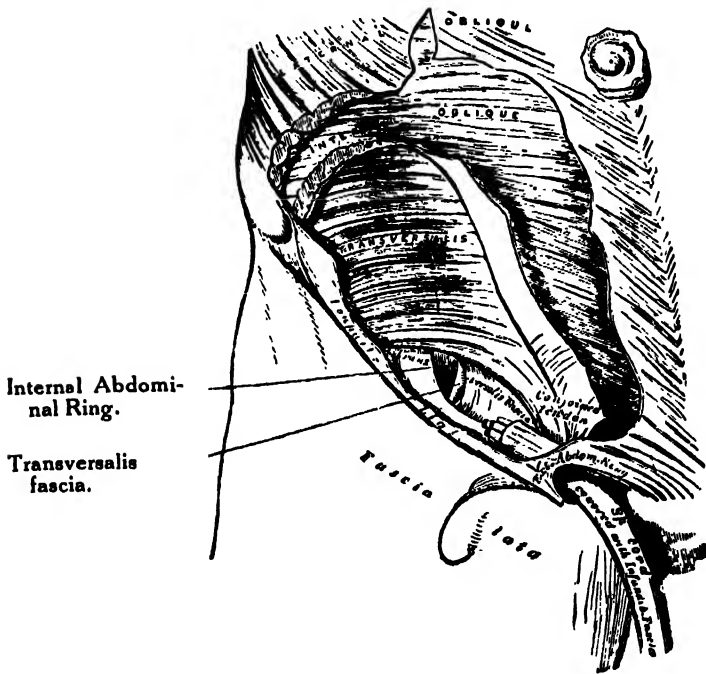


Fig.—Showing Internal and External Abdominal Rings.

The *boundaries* of the Inguinal Canal.—

In front.—The skin, superficial fascia, aponeurosis of the external oblique muscle throughout its whole length, and the Internal oblique muscle on its outer third.

Behind.—The Triangular Ligament, the conjoined tendon of the Internal oblique and Transversalis muscles, transversalis fascia, sub-peritoneal fat and peritoneum.

Above.—The arched fibres of the Internal oblique and the Transversalis muscles.

Below.—The union of the Transversalis fascia with the Poupart's ligament.

In the normal condition, the Inguinal Canal contains the Spermatic cord in the male, and the Round ligament in the female. The Spermatic cord is composed of the Spermatic arteries, Spermatic veins, lymphatics and the Spermatic plexus of nerves connected together by areolar tissue, and surrounded by the fascia pushed ahead by the Testis which during its descent, passes through the Internal Abdominal Ring, the Inguinal Canal, and finally through the External Abdominal Ring, down into the scrotum. In the female the Inguinal Canal has the same boundaries as in the male, but the contents of the canal are obviously different. They are the Round Ligaments of the ovary consisting of areolar tissue and the muscular fibres prolonged from the uterus, enclosed in a fold of peritoneum. The Round Ligament of the uterus ends into the labia majora in the female.

An Inguinal Hernia may be complete or incomplete.

It is a Complete Inguinal Hernia when the protrusion enters the Inguinal Canal through the Internal Abdominal ring and along with the Spermatic cord in the male and Round Ligament in the female, progressing further onwards, it finally makes its way through the External abdominal ring, and enters into the scrotum in the male and labia majora in the female.

It is an Incomplete Hernia when the protrusion on its way passing through the internal abdominal ring, does not enter the scrotum, and is detained as a 'Bubonocoele' behind the External abdominal ring, and is practically within the Inguinal Canal.

Causes.—1. Congenital.

2. Acquired.

Congenital Causes.—(a) Late descent of Testis.

(b) A patent funicular process of Peritoneum which in the male proceeds with the testicle in its passage downwards from the abdominal cavity into the Scrotum,

and in the female its passage along with the Round Ligament.

- (c) Congenital weakness of the abdominal muscles and the parietis, also the patent abdominal rings.
- (d) Persistent straining during micturation in cases of congenital Phymosis may cause hernia.

Acquired causes.—Any condition that tends to weaken the abdominal parietis, or increases the intra-abdominal pressure, also violent physical strain of an intermittent character *e.g.*, lifting a heavy weight,—specially when in doing so, the subject is compelled to keep his upright position, such as lifting a heavy barbell at arms length above head in the "Military Style" (that is finishing the lift with the feet kept in attention) or usually lifting a heavy barbell in the "Continental Style"—where the bar with the whole weight is placed horizontally on the abdomen for a while, before it is pressed upwards above the head. The wearing of too tight a waist band, or too much loaded intestine during a strenuous weight-lifting performance determines its occurrence.

2. Chronic Bronchitis of a severe type aggravated by a violent and constant cough causes Inguinal hernia by increasing a violent intra-abdominal pressure.

3. Prolonged straining for micturation in cases of enlarged Prostate, along with flabby abdominal muscles of old men favours the production of hernia

4. Excessive accumulation of Parietal as well as omental fat in obese persons is a predisposing factor in the production of inguinal hernia by causing an increase in the intra-abdominal pressure.

Treatment.—In the treatment of hernia (Inguinal), the Parietal Muscles of the abdomen are the most important structures that are to be carefully dealt with.

When the hernia has passed through the internal abdominal ring, and is lying in the Inguinal canal, but has not passed through the external abdominal ring, careful use of a truss helps to support

the weight of the hernia and systematic abdominal exercises, also regular massage give tone to the muscle and tendons forming pillars of the rings ; gradually the hernia is cured in a comparatively short period. But where the contents of the hernia pass occasionally into the Scrotum, the use of a truss should always be encouraged. Again proper exercise of the abdominal muscle as well as massage helps the cure. Radical cure by operation has in been in vogue for a long time. People suffering from an Inguinal hernia should always be careful to keep the bowels clear, and as a matter of fact, the intestines should never be kept loaded for a long period as that will enhance strangulation.

Exercises recommended.—

- Group I.—Exercises Nos.—40, 10 (having a lying down position as in Fig. 74), for one month.
- Group II.—Exercises Nos.—60, 22, 23, 24, 25, plus Group I for a fortnight.
- Group III.—Exercises Nos.—42, 42(a) plus Groups I and II for one month.
- Group IV.—Exercise No.—62 (lying down position as in Fig. 74). plus Groups I, II, III, for about six weeks.
- Group V.—Exercises Nos.—9, 10, 10(a), 18, 19, 19(a), and 20, plus Groups II, III, and IV for about two months.
- Group VI.—Exercise No.—27(a) with the arms stretched above head, plus Groups III, IV and V for about two months.
- Group VII.—Exercise No.—27(b), with Groups III, IV, V, and VI.

In old people having high blood pressure, Exercises Nos. 27(a) 27(b) or any other exercise which requires lying down, and keeping the head at a lower level than that of the feet, should be strictly avoided.

The control of the Rectus and the Oblique muscles may be tried without holding the breath. Massage in the form of tapotement such as light kneading should be applied after the exercise for about 15 minutes.

In a case of hernia, the use of truss is imperative. The patient should always be careful to reduce the hernia first by "Taxis" (as is the usual process), put on the truss, and then go in for the abdominal exercises. I should always like to recommend the use of some sort of "Suspender" as an absolute necessity, when going in for the exercises.

FEMORAL HERNIA

A Femoral Hernia is one which consists in the intestines (mostly a portion of the Ilium), and subperitoneal fat, travelling down the crural canal, appears at the inner part of the thigh, through the saphenous opening. A Femoral Hernia is much more commonly found in women and especially those who have borne children. In women, the expansion of the Iliac crest is always greater than in men. This greater expansion allows an increased space beneath the Poupart's ligament.

Structure of the Crural Canal.—It is a narrow space situated between the femoral vein and the inner wall of the crural sheath. This space becomes a distinct canal when the crural sheath has been separated from the femoral vein by the pressure of a tumour or a hernia. The Crural Canal is about a quarter to half an inch long. It extends from the Gimbernot's ligament to the upper part of the Saphenous opening.

Boundaries of the Crural Canal.—The *anterior wall* is formed by a continuation of the transversalis fascia downwards, covered by the falciiform process of the Fascia Lata under the Poupart's Ligament.

The *posterior wall* is formed by a continuation downwards of the portion of the Iliac Fascia which covers the pubic portion of the Fascia Lata.

The *inner wall* is formed by the union of the processes of the Iliac and the Transversalis fascie which constitute the inner side of the Femoral Sheath. This conjoined portion lies in contact with the outer edge of the Gimbernot's Ligament at its origin.

The *outer wall* is formed by the fibrous septum situated between it (the Crural Canal) and the inner side of the femoral vein.

There are two openings of the Crural Canal.—

1. *Crural* or the Femoral Ring.
2. The *Saphenous* opening or ring.

The Femoral (Crural) Ring is bounded :—

In *front*.—By the Poupart's Ligament, and the thickened band of fibres (a thickening of the Transversalis Fascia), called the deep crural arch.

Behind.—By the Pubis, covered by the pectineus muscle, and the pubic portion of the fascia lata.

Internally.—By the Conjoined Tendon, the base of the "gimbernot's" ligament, the transversalis fascia and the deep crural arch.

Externally.—By the fibrous septum situated on the inner side of the femoral vein.

The Femoral Ring is the upper opening of the femoral canal, and leads into the cavity of the abdomen. It is closed by the Septum Crurale (a layer of condensed areolar tissue) which serves as a blockage against the protrusion of a hernia through the ring. It is of an oval form, the longest diameter being about half an inch. It is greater in the female, than in the male. So the Femoral Hernia is more common in the former than in the latter. The frequency in the female is also due to the larger size of the Femoral Ring, and the changes in the tissues of the abdomen during pregnancy.

The Saphenous Opening.—It is an oval-shaped opening, about half an inch long, and half an inch broad, situated below

the poupart's ligament at the upper and the inner part of the thigh. It is directed obliquely downwards and outwards.

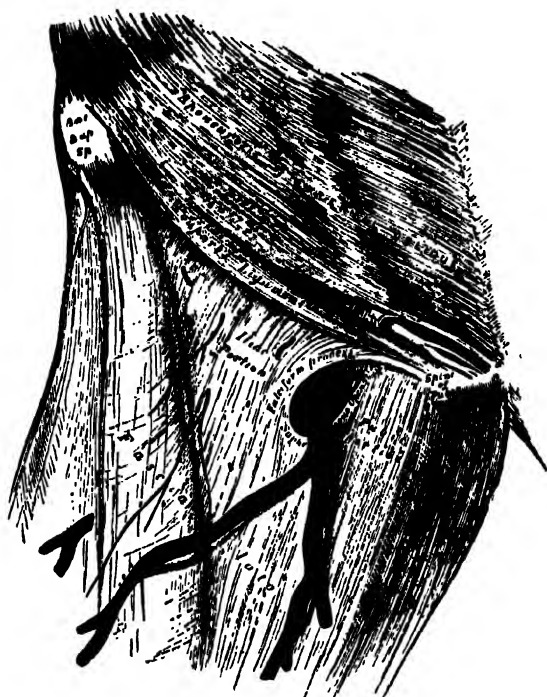


Fig.—Showing the Saphenous Opening and the Fascia Lata.

The inner margin of the saphenous opening is situated on a plane posterior to the outer margin, and behind the level of the femoral vessels as shown in the above figure.

In a healthy subject, the Saphenous Opening is felt to be constricted when the lower limb is moved outwards (everted), and is felt to be relaxed when the limb is inverted (moved inwards).

The coverings of a Femoral Hernia from within outwards.—

1. Peritoneum.
2. Sub-serous cellular tissue.
3. Septum Crurale,
4. Crural Sheath.

5. Cribiform Fascia.
6. Superficial Fascia.
7. Skin.

The direction which the Hernia takes during its descent from the abdominal cavity down in the thigh, is downwards, forwards and upwards.

The descent of the hernia.—The Femoral Ring is a weak point in the abdominal wall, so when a violent or long-continued pressure is put upon the abdominal viscera, a portion of the intestine may be pushed into the ring, causing Femoral Hernia. When so happens, it carries before it the coverings mentioned above, and presents a bulging mass below the poupart's ligament in the front of the thigh.

A Femoral Hernia is of two types :—

1. Incomplete.
2. Complete.

An incomplete Femoral Hernia is one in which the contents of the hernia (the intestines) descend along the femoral canal only as far as the Saphenous Opening ; but does not go beyond that aperture.

A complete Femoral Hernia is one, in which the hernial mass protrudes through the saphenous opening, proceeds upwards and outwards along the poupart's ligament towards the Anterior Superior Iliac Spine. When the protruded mass acquires a considerable size, it may extend much above the level of Poupart's Ligament.

Signs.—There is a swelling with an impulse on coughing, situated on the inner side of the thigh, having its neck at the saphenous opening, and the inner side of the femoral vessels, and the outer side of the Pubic brim.

Treatment.—Strangulated and irreducible hernias are treated by surgical operations.

When the hernia is incomplete, or it is reducible, a suitable truss as shown in the figure below should always be worn, and the following set of exercises should be practised.

Exercises Nos.—9, 42, 42(a), 43, 51, 10(a), 18, 20, 21, 29, 27, 27(a), 27(b), and for general physical development Exercises Nos. 14 and 15.

Proper exercise of the Psoas, Iliacus, Pectineus, Sartorius and the Adductor muscles of the thigh helps the prevention as well as the cure of a Femoral Hernia. The exercises not only improve the tone and the contractile power of the above-mentioned muscles, but they improve and give tension as well strength to the Fascia Lata which with the falsiform process of its Iliac portion forms the Saphenous Opening.

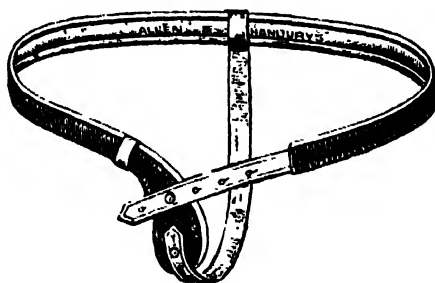


Fig.—A truss suitable for a case of Femoral Hernia.



Dupuytren's Contracture.

(Facing page 253)

CONTRACTION OF THE PALMER FASCIA (Dupuytren's Contracture)

This trouble is common among middle-aged people with Gouty Diathesis. It affects both men and women, and on both sides of the body. It is due to constant use of some instrument *e.g.*, an awl, or constant leaning on a round-headed cane. Heredity plays a very important part in the causation of Dupuytren's contracture.

Morbid Anatomy.—There is a chronic over-growth and contraction of the Palmer Fascia causing the deformity of the hand. The growth is inflammatory and sclerosing in type. The contraction most commonly affects the ring and little fingers. The fingers become strongly flexed towards the palm.

Treatment.—Surgical interference is the best process. It consists of the total extirpation of the thickened bands and their prolongations through longitudinal incisions. The fingers are straightened, and a splint is applied. When the wound is healed, massage and passive stretchings should be tried. Then exercises for the extension of the fingers should be practised for some period.

Exercises recommended.—Exercises Nos. 12, 14 (with the palm of the hands kept perfectly flat on the ground, also the fingers wide apart from each other).

Exercises for general constitutional improvement should also be encouraged.

CHAPTER X

DISEASES AND INJURIES OF BURSAE

BURSITIS (Inflammation of Bursae)

Bursae exist as normal structures in those parts of the body that are exposed to pressure. They allow a sort of gliding movement, and lessen the friction of the part where they are situated. They consist of a fibrous wall lined by a serous membrane, and contain a small quantity of oily substance.

Adventitious Bursae are those that are developed in the regions where a very great amount of pressure is put to some important structure. These Bursal sacs contain a small quantity of serum, and they are formed as localised effusions in the tissues. Typical examples of Adventitious Bursae are the "Humps" of porters, or fish-carriers. Indian coolies of the low lands who generally carry the loads on their heads, have this sort of Bursae in the centre of their scalp. Other classes of Indian coolies such as milk-carriers or "dooly-bearers" who carry their loads on their shoulders, have humps on the trapezius muscles.

Injury to Bursae.—Penetrating wound or splitting of the skin over the Bursae *e.g.*, in the case of a fall on the point of the olecranon process of the ulna. The Bursal fluid escapes, and the healing of the wound is retarded. Surgical interference is required.

Acute Simple Bursitis.—It may result from a contusion or *from a sort of long-continued irritation in a Gouty subject.

Symptoms.—The affected part becomes oedematous and painful, and is tender on pressure. Effusion quickly takes place inside the cavity. If the affection be a traumatic one, the effused fluid is mixed with blood. On the serous surface lymph is deposited, resulting in the formation of adhesions,

Treatment.—Rest and fomentation, also constitutional remedies should be resorted to. Before the formation of adhesions, massage and passive movements are very useful. In chronic cases, massage and both passive and active movements are advisable. If the effusion persists, surgical interference such as aspiration of the fluid or the excision of the whole cavity may be necessary.

Acute Suppurative Bursitis.—It occurs in the case of infection arising from within or without. The sac may be distended with blood. Suppuration ensues, also local and constitutional symptoms manifest. Superficial or deep abscesses are formed. The pus formed inside the infected capsule, it may travel towards the surface, or burst through the capsule and is diffused through the tissues.

Treatment.—Surgical interference such as free incision, drainage and anti-septic dressings should be resorted to. As soon as the wound heals up, passive movements and massage should be given, and gradually active movements finish the whole treatment.

Chronic Bursitis.—The bursal cavity becomes distended with serous effusion, and a fluctuating tumour is formed. If there be frequent recurrences, the inside of the Bursal sac becomes reticulated, and adhesions or fibrous cords are formed.

Treatment.—Rest and counter-irritation such as the application of Tinct. Iodine or a blister are useful. But if this treatment be not successful, the sac may be dissected out. As the wound heals up, passive movements and massage should be given, then gradually active movements should follow.

Chronic Fibroid Bursitis.—Due to continuous irritation, or sometimes from the effect of Syphilis, the walls of the Bursae become chronically thickened. The amount of effusion in these cases is very scanty, and a hard fibroid tumour is felt at the site of the Bursae.

Treatment.—Surgical interference such as Removal of the tumour like swelling and systematic treatment for Syphilis should be resorted to.

Chronic Tuberculous Bursitis.—

Treatment.—Surgical interference such as opening the cavity, scraping away all the tuberculous deposits and application of anti-septic dressings are required.

If other parts such as a subjacent joint be not affected, massage, passive and later on active movements are required to complete the treatment.

Tonics and exercise for the improvement of the general constitution are necessary.

AFFECTION OF SPECIAL BURSAE

INFLAMMATION IN THE PREPATELLAR BURSA (Housemaid's knee.)

Causes.—Frequent kneeling posture such as common in house-maids, or a blow in front of the Patella.

Symptoms.—1. Tension and stiffness of the knee-joint.

2. A rounded swelling in front of the Patella.

3. Pain and tenderness in the knee-cap felt specially when kneeling.

4. There is no pain or swelling inside the joint capsule, nor is any pain felt during the movement of the joint itself.

Treatment.—In acute inflammation of the Bursa following some injury or a wound, the limb should be kept on a well-padded splint, and Goulard's lotion or ice applied. After some 24 hours application of ice, hot fomentation is indicated. In chronic cases, so long as the walls of the Bursae are not much thickened, repeated applications of Tinct. Iodine causing slight blister is effective. If this fails, the fluid may be aspirated. Effleurage and massage should be given to remove the inflammatory products.

In chronic cases with marked thickening of the walls of the sac, massage is of no use ; surgical excision of the sac is necessary. After the wound is healed, massage and passive movements

should be applied, and then gradually light active movements should be advised.

Passive movements.—The patient sits on a chair, the masseur holds the patient's foot with his right hand, his left hand holding the front of the knee joint and carefully supporting it. He will now extend the leg slowly, and then flex it backwards gradually, making a complete bend, and again extend it as far as possible alternately, (for 1 to 20 times). After this sort of passive movements for about a week, active movements should be tried.

Active Movements.—The patient sitting on a chair, will extend and bend his leg voluntarily. Exercises No. 54. The movements should be slow in the beginning, number of movements being 1 to 20.

After starting the voluntary movements for 2 or 3 days, the patient should try to walk with the help of a stick or crutches, or keeping his body weight on another's shoulder for a few days, and then try to walk without any help.

Massage should be continued for 10 or 15 minutes after the active movements and walking.

After a month or so, the patient should attempt Exercises Nos. 42, 42(a), 15, 16.

Later on, brisk walk and running may be practised.

Inflammation Of the Bursa beneath the Patellar Ligament.—

The inflammation starts in the Bursa between the Ligamentum Patella and the head of the Tibia. Fluid accumulates in the bursal sac and a fluctuating swelling is felt on either side of the ligament. The swelling becomes more prominent, specially when the limb is extended; and becomes less prominent when it is flexed. As the trouble becomes more chronic, the patient becomes unable to stand; and the case seems to be one of displaced semi-lunar cartilage, or a loose foreign body in the joint.

Treatment.—Surgical interference is necessary. After the wound is healed, massage, also passive and active movements similar to those mentioned under Pre-patellar Bursa are recommended.

Inflammation of the Bursae in the Popliteal Space.—The Bursae between the inner heads of the Gastrocnemius and Semimembranosus muscles.

As the Bursae are situated close to the Popliteal vessels, pulsation is occasionally felt. The diagnosis from Aneurism of the vessel shows that the pulsation is only heaving in character, but not expansile.

Treatment.—If rest, counter-irritation and massage fail, surgical interference such as removal of the Bursa is necessary. After healing of the wound, massage, passive and active movements as in the case of Patellar Bursitis are recommended.

Inflammation of the Bursa beneath the Tendo-Achilles.—

Symptoms.—There forms a fluctuating swelling on either side of the tendon. The trouble is due to pressure from tight or ill-fitting boots.

Treatment.—General treatment of Bursitis. Later on loose fitting boots should be provided, and Exercises Nos. 15, 16, also free walking encouraged, at first bare-footed for a few days and then with loose-fitting boots.

Inflammation of the Bursa beneath the Psoas Tendon.—

Signs.—There is a swelling which projects anteriorly, and could be felt on the inner side of the Scarpa's triangle.

Treatment.—General treatment of Bursitis. But as the Bursa in certain cases, communicates with the joint, surgical interference may be necessary. In such cases after the wound is healed, the following procedure should be attempted :—

Massage and Passive Movements.—The patient should lie on his back, the masseur will hold the foot with one hand, and grip the thigh with the other ; he will now straighten the leg, and lift the whole lower limb slowly at right angles to the body, and slowly lower it down to the bed, for a number of times (1 to 20) for a week. Next, in addition to these manipulations, he will try to move the lower extremity (kept in a stretched condition) inwards

and outwards alternately for a number of times (1 to 20). Then circular movements should be tried with and against the hands of a watch, number of movements being (1 to 20), followed by massage. After manoeuvres like this for about a fortnight, the patient should try active movements similar to those passive movements tried before.

Exercises recommended :—

Group I.—Exercises Nos.—42, 42(a), 43 also circumduction of the leg followed by massage.

Group II.—Exercises Nos.—26, 27 followed by massage.

Inflammation of Gluteal Bursa.—

Symptoms.—There is a fluctuating swelling felt behind the great Trochanter as the Bursa is situated between the insertion of the muscle Gluteus Maximus and the great Trochanter. The limb assumes an everted and abducted position, in order to keep the Gluteus muscle relaxed. It may resemble tuberculous hip ; but the diagnosis is very simple as passive movements only cause little pain in Gluteal Bursitis, whereas in tubercular hip, the pain is present along with other constitutional symptoms.

Treatment.—Ordinary treatment of Bursitis is required. But if suppuration occurs, the pus may burrow widely beneath the Gluteus muscle, when surgical interference is necessary.

Exercises recommended after the healing of the wound :—

Exercises Nos.—42, 42(a), 43, 29, 30, 31(a) followed by vigorous massage.

Inflammation of the Bursa under the Deltoid Muscle (Sub-Deltoid Bursa).—

As the Bursa is multilocular and occasionally enlarged, it causes a big prominence of the Deltoid ; and the shoulder seems to be expanded.

Treatment.—Rest and counter-irritation. If they fail, surgical interference such as incision of the cavity and draining of the fluid are necessary. After healing of the wound, light free-hand exercises of the arm and shoulder along with massage should be encouraged.

Exercises recommended :—

Exercises Nos.—5, 44, circumduction of the arm (stretched) in and outside,

CHAPTER XI

DISEASES OF THE VEINS

PHLEBITIS

(Inflammation of the Walls of the Veins)

Two forms of Phlebitis are usually met with.

1. Simple Phlebitis.
2. Spreading Infective phlebitis.

Simple Phlebitis.—It is a sort of localised inflammation of the walls of a vein associated with Thrombosis. The inflammation usually extends from the inflammatory focus a little up and down the vein ; but never goes beyond the next patent branches.

- Causes.**—1. Local Injury.
2. Idiopathic,—in gouty subjects generally.
 3. Extension from Periphlebitis.
 4. Sequela of a primary Thrombosis.

Spreading Infective Phlebitis.—It is a serious inflammatory condition, and is always an extensive one.

- Causes.**—1. Septic infection by organisms from a neglected surgical wound.
2. An auto-infection from the clot in a simple Phlebitis.

Morbid Anatomy.—The walls of the veins are thickened and congested. There is infiltration and hypertrophy of the endothelial cells in the inner lining of the wall. The inflammation may involve the intima or the adventitia of the vein causing endophlebitis or periphlebitis respectively. Periphlebitis is caused by the extension of the inflammation from some neighbouring foci. Endophlebitis is the result of coagulation (Thrombosis) of blood inside the vein. The Thrombosis contained in the vessel assumes different characters. If it is infected by any septic material, localised abscess is formed, or the suppuration extends for some

length around the veins. The coagulated stuff may sometimes altogether block the lumen of the vein, or become channelled, and allow the circulation to go along.

Symptoms.—In Phlebitis of a superficial vein, the vessel appears to be swollen, it becomes hard and painful. There are localised enlargements corresponding to the valves. Localised Oedema is also present. The skin over the swelling looks red, and is congested. Suppuration may occur.

Phlebitis of deep seated veins cannot be easily detected by pulsation. But over the site of the vein, there is deep-seated localised pain as well as Pyrexia.

Treatment.—Complete rest especially of the affected part is imperative. Belladonna and Glycerine should be applied locally, and lightly bandaged. Antiphlogistine should be applied with hot fomentations on the top of it. Resolution occurs in several cases.

Diet.—The diet should be nutritious and stimulating.

Massage.—When the signs of inflammation have all subsided, and the absorption or the organisation of the clot (which usually takes about two or three months) is complete, massage may be started in the form of effleurage in the beginning, to assist the removal of the Oedema and local thickening. An elastic bandage should be applied to facilitate the proper circulation for a long period.

If an abscess is formed, surgical interference is necessary. The septic material is let out, and the wound is dressed.

Massage and exercise should not be recommended for some time even after the complete healing of the local Phlebitis. After a week or so from the date of complete subsidence of the inflammatory symptoms, light massage and free-hand exercises should be advised. Strenuous exercises should not be practised for at least three or four months after the case is apparently cured.

THROMBOSIS

Thrombosis means coagulation of blood in the circulatory system. It may be in the arteries, veins or in the cavities of the heart. The clot itself is called the "Thrombus".

Causes.—1. Local changes in the walls of the vessels due to injuries like contusion, compression, rupture or puncture, causing solution of continuity of the Endothelium

2. Inflammation in the walls of the vessels or its surrounding area.

3. The coagulability of blood being increased by changes in the consistency of the blood. Such conditions may be due to :—

(a) Toxins resulting from septic infection.

(b) Heavy loss in the amount of blood in the whole system.

(c) Presence of an excessive quantity of extractives or salts in the blood.

4. Slowness of blood stream due to general debility or heart disease, varicose veins, typhoid or rheumatic fevers.

5. Retardation of the flow of blood caused by the pressure of a tumour on a vein produces a clot on the spot where the nutrition of the wall is interfered with.

Symptoms.—Locally, there are marked dilatation of the veins and capillaries, also Cyanosis, swelling and Oedema. Localised pain and a sensation of tension are present.

There is diminished or complete loss of power of movement of the limb affected.

If the vessel is superficial, a cord-like swelling tender on pressure, is felt at the site of the Thrombus.

The course and result of Thrombosis may be indicated by changes in the site, and in the constitution.

Some time after the formation of the Thrombus, the clot may be organized into connective tissue.

Through adhesion of the Thrombus to one side of the vein or canalisation of the clot, the lumen of the vessel may be re-established. The clot may get softened or disintegrated into small particles, and may be washed away as such into the circulation.

If the clot be of septic origin, local abscess or general Pyemia and death may result. In some cases, the clot may get transformed into a calcareous lump.

Treatment.—Similar to that of Phlebitis.

EMBOLISM

It may be caused by any foreign body which travels for some distance in the blood vessels, and becomes lodged at a place where the vessel is too narrow for its further progress. This foreign body is termed an Embolus. This can only take place in arteries and portal veins.

The Emboli are of different varieties.—

(a) **Simple Emboli.**—These are blood clots, atheromatous plates or fibrinous vegetations from the valves of the heart, air bubbles (such as are found during careless intravenous injection of fluids) or fat globules (fat embolism) found after fracture of bones.

(b) **Infective Emboli.**—Masses of bacteria or detached portions of blood clots travelling through the vessels, set up pyemic abscesses wherever they are lodged.

(c) **Malignant Emboli.**—Portions of some malignant growths such as a Sarcoma may be carried along the blood current and get lodged at a narrow vessel.

(d) **Parasitic Emboli.**—May be formed by ova or small body of parasites, e.g., *Filaria Sanguinis Hominis*.

Pathological Changes and Effects of an Embolus travelling in the system.—

When an Embolus becomes lodged in a vessel too narrow to allow further passage of the clot, deposits of fibrin from the blood are formed on it, and make the lodgment of the mass and the obstruction of the local blood current complete. Usually there is organisation of the Thrombus, or it may get disorganised and disappear. Later on an aneurism may develop at this spot which is left weak after the process of disintegration of the clot. If the clot reaches a place where the artery gives off anastomotic branches, there may be temporary anaemia of the part supplied by the artery; but if there is no such branch, the obstruction will lead

to death of the part supplied by the artery, causing gangrene of of the limb, or white softening of the brain in case there is blockage in some cerebral arteries. Wedge-shaped areas called "Infarcts" are sometimes found in organs like the spleen or kidney, due to obstruction of their vessels by an Embolus. These areas eventually lose vitality and practically become useless.

Symptoms.—Due to lodgment of an Embolus in different organs :—

In the brain—Hemiplegia is very common. In the central artery of the Retina—total blindness.

In the spleen—pain and rise of temperature.

In the kidney—sudden acute pain in the kidney and haematuria.

In the lung—death ensues if a large vessel is obstructed. If a small vessel is blocked, pain and dyspnoea manifest and an infarct is found after death.

In the intestines—when lodged in the Intestines, an ulcer is formed, or an extensive gangrene may follow.

In the limbs—sudden pain is felt at the site of the blockage. Resolution may occur, or gangrene of the limb takes place beyond the blockage.

Treatment.—Similar to that of Thrombosis.

VARICOSE VEINS

A vein is termed Varicose when it becomes dilated, more or less tortuous and consequently lengthened.

Causes.—1. Predisposing.

2. Exciting.

Predisposing Causes.—Hereditary predisposition due to congenital weakness of the walls of the veins, or irregularity in the position of the valves in the vein.

Exciting Causes.—

1. Prolonged standing or walking.
2. Prolonged and strenuous physical exercise, where there is always a tendency to hold the breath.
3. Tight-fitting clothings, such as, tight laced corset—these obstruct the normal respiration, and consequently the circulation is hindered.
4. Pressure on veins due to use of garters. Scar tissue near about the vein, tumours of the leg or the pelvis. In several cases, gravid uterus causes varix of the lower limb.

The tendency to develop varicose veins increases with age till 45 or 50 years. It is also favoured by sedentary habits which cause general relaxation of the system.

Morbid Anatomy.—The walls of the veins get distended and thickened. Their valves atrophy, and later on, they become tortuous and consequently lengthened. Of the 3 layers of the vein, the Tunica Adventitia is thickened, the Tunica Intima is not much affected, while the Tunica Media is chiefly affected as most of its muscular structure disappears.

Symptoms.—1. There is visible dilatation of the veins ramifying under the skin and assuming a tortuous course.

2. A feeling of tightness and pain is often felt in the region of the varicose vein, and is increased after long standing or walking. In case of varicosity of the lower limb a light Oedema is also produced at the ankle, due to increased pressure in the capillaries.

3. Due to impaired circulation, Cellulitis is usually formed.

4. Eczema is usually induced by friction of rough clothings (trousers etc) resulting sometimes in ulcerations.

5. In cases of deep-seated varicose veins situated intra-muscularly, cramps are occasionally experienced.

6. Injury to the varicose vein may lead to Thrombosis and spontaneous cure.

7. In case of varicosity of the spermatic veins (Varicocoele)—the veins become tortuous and dilated in character. They look like earth worms, become prominent, and swollen after long standing or walking. Usually the symptoms aggravate after constipation.

Treatment.—The first step in the treatment of varicose vein is to remove the sources of obstruction such as tight garters or corsets. Strenuous exercise of the limb should be reduced, or avoided as much as possible. Bowels should be properly regulated. Eczema if present on the site of the varix, should be treated with some soothing and drying ointments.

Elastic putties, India-rubber bandages or stockings should be worn, especially when standing or walking. The windings should be started from the distal end of the limb and finished towards the proximal one.

Massage.—Massage of the light effleurage type should be carefully applied. It should be stopped whenever there is any local tenderness which indicates the formation of a Thrombus. Hard pressure may dislodge the Thrombus which becomes a source of danger.

To improve the tone of the nonstriated muscle fibres of the venous walls, vibratory massage may be given up and down the vein.

Exercises.—

Light open air exercises should be encouraged. As regards indoor exercises the following may be attempted.

Group I. Exercises Nos.—33, 34, 5, 44, for a fortnight, and then—

Group II. Exercises Nos.—9, 13, 14, 26, 29, 30, 31, in addition to Group I.

Regular mild massage should follow the exercises. The limbs should be kept in an elevated position during the massage, and after the massage elastic bandages should be worn.

CHAPTER XII

FRACTURES

Fracture is a sudden solution of continuity in a bone, caused by some external force or violence. Fractures may occur in three different stages of life.

- (a) Intra-uterine.
- (b) Congenital.
- (c) Extra-uterine.

Intra-uterine Fracture.—It may be caused in a subject when it is in the uterus of the mother. Accidental blows on the mother's abdomen may cause fracture in the bone of the Foetus. Violent uterine contraction also sometimes may cause Fracture in the Foetus.

Congenital Fracture.—It may be caused by violence used by the accoucheur. The skull may be broken by unskilful handling with the forceps, or the femur may be broken due to undue traction.

Extra-uterine Fracture.—It may be caused by an injury direct or indirect.

Causes.—

Predisposing Causes.—1. **Age.**—There are variations in the strength and elasticity of bones and their liability to injury at different periods of life. During the ages 2 to 4 years, due to their unbalanced gait, children get frequent falls, so fractures are very common in this period. From 5 to 8 years of life, fractures are less common as during this period children become more steady in their walking and other movements. In this period the bones are soft, and almost all the epiphyses of the long bones remain ununited to their diaphyses. So during this period, children get fractures of a "green stick" type, for the same reason. The ununited Epiphysis may get separated from the

Diaphysis when it is subject to an external violence. From 8 years onwards fractures occur in a steadily increasing way. Again during old age, owing to their bones getting brittle, people get fractures very commonly.

2. **Sex.**—Up to 7 or 8 years of life, fractures are equally common in children of both sexes; but with the increase of age, men become more liable to fracture than women. After 45, fractures are more common in women owing to their susceptibility to "Colle's" fracture at the wrists, and Intra-capsular fracture of the cervix of the femur.

3. Due to some special pathological condition of the bone, a "Spontaneous fracture" is caused by a very slight external violence. These pathological conditions may be :—

- (a) Atrophy of bone due to senile change.
- (b) Bone of an apparently healthy paralysed limb or an ankylosed joint.
- (c) *Fragilitas Ossium*—In this, the patient has an inherited tendency to fractures. He may get several fractures in different periods of life from his childhood.
- (d) General Bone Diseases such as Rickets, Osteomalachia.
- (e) Local Bone Diseases such as a Sarcoma or a Local Caries of Bone may cause this predisposition by weakening its structures.

Types of Fractures.—

- (a) Simple—Complete.
- (b) Simple—Incomplete (Green Stick).
- (c) Compound.

Simple—Complete.—In this, the bone is broken, but the skin above the lesion is not broken so that the external air has got no communication with the part of the bone involved in the injury.

Simple—Incomplete (Green Stick).—This sort of fracture is common amongst subjects of young age when the long bones are soft and elastic.

Compound.—A compound fracture is one in which the skin, the subcutaneous and the other tissues at the site of the injury are broken, and so the external air has got access to the part injured underneath. In this case, there is a chance of sepsis, and the union of the broken pieces of bones is delayed. Fractures may be complete or incomplete.

Complete fractures of bones may be :—

Oblique—due to the violence being an indirect one.

Spiral—due to the force of violence working in a rotatory direction, also longitudinal.

Transverse—due to the force of violence applied perpendicularly to a long bone.

Longitudinal fracture—is due to the splitting of the bone in its long axis. This form of fracture is very common in gun-shot injuries.

Impacted fracture—is one in which the fragments are placed in such a way that one of the fragments is driven into another.

Comminuted fracture—is one in which the bone in question is broken into more than two pieces.

Separation of Epiphysis.—It is very common in cases of violence directed to the end of long bones. Separation of the epiphysis is usually found at the ends of the femur, humerus and radius. The direction of the separation is almost always transverse.

Symptoms.—1. **Local Symptoms.**—Violent pain and rapid swelling at the site of the injury, due to effusion of blood from the broken as well as lacerated periosteum and the bone substance. Blebs sometimes appear at the site of the injury in course of a few hours. Care should be taken not to disturb the Blebs. There are contusion marks on the skin at the site of violence. There is infiltration of blood in the subjacent structures which later on, causes thickening of the tissues, and consequently serious thickenings and adhesions are formed causing movements greatly

limited. Usually in simple fractures, the inflammation subsides causing Fibrosis. But in very weak patients, suppuration at the site of the injury may take place.

2. Deformity of the part injured.—This is caused by the muscular action of the separated fragments of bones.

3. Partial or complete loss of function of limbs.

4. Crepitus is felt when the ends of the injured bones are rubbed (by manipulation) against each other. But crepitus is not experienced when the fracture is of an impacted variety, or a mass of muscular or other tissues intervene between the broken pieces of bones.

General Symptoms.—Shock is experienced more or less according to the extent and the importance of the site of the violence. There may be slight faintness or marked prostration. Fractures in the head or in the spinal column will give rise to very serious constitutional symptoms.

Fever.—Usually called “Fracture Fever” occurs in cases of Simple Fracture, although there is no chance of infection from outside air. This is due to the absorption of fibrin ferment. In ordinary compound fractures, there is every chance of septic infection giving rise to septicaemia.

Fat embolism.—The broken-up fat globules of the lacerated fatty tissues caused by the fracture, may be absorbed, and carried with the blood stream to various parts of the body. These globules may cause pulmonary obstruction, and the patient may die from the effects of Dyspnoea, Cyncope or Coma which may be caused by these fat globules blocking the cerebral vessels.

Changes that take place in a fracture in the process of its healing.—When there is a fracture, the broken ends of the bone remain separated from each other. The periosteum is torn, a portion of which almost always is left unbroken. The muscles and the neighbouring tissues are torn, and lacerated.

Blood is extravasated in the surrounding tissues, causing a sort of persistent irritation. Eventually, a sort of chronic inflammation is set up. Shortly after the occurrence of the fracture when the parts are kept at rest, the process of repair sets in, the blood clots already extravasated, become invaded by leucocytes. The process of the formation of granulation tissue takes place. The constituent cells derived from the bone, particularly the periosteal portion set about forming Osteo-blastic cells, resulting in bone formation round the broken edges of both bones. Bone salts get deposited, and gradually a mass of soft spongy bone (provisional callus) is formed. After 2 weeks or so, bone salts begin to be deposited in the form of small granules in this newly-formed tissues, and make it harder. In course of a month or so, this becomes transformed into bone substance. The central portion of the callus is gradually absorbed, and a ring of newly formed bone (permanent callus) is left at the site of the fracture. Again as a result of chronic inflammation, the other tissues surrounding the fracture are infiltrated with blood and get thickened.

Treatment.—First the broken ends of the fractured bone should be set, that is placed properly and at a close proximity to each other. Care should be taken to put them in a way so that no muscle or other tissue intervenes, and this purpose could be attained by the process of "Reduction" which is accomplished by extension applied to the lower portion of the limb with manipulations of the fractured ends. There must be one assistant to maintain counter-extension. Now, when the fractured ends are put in proper position, the limb should be fixed on a splint or with paris plaster. This sort of immobilization of the parts with fixation should be left for 10 to 15 days ; and after that period, a sort of moveable splint should be applied which could be removed and replaced. Now massage and passive movements should be started. Massage with oil or some powder e.g. Boric acid should be used to facilitate healing of bone by promoting the blood circulation of the part. The massage and friction should also be applied to the neighbouring parts of the site of the fracture in order to get rid of the infiltration

of blood and inflammatory products accumulated in those soft tissues.

The neighbouring joints and tendon sheaths which have been immobilized by fixation of the fractured limb, should be properly massaged to relieve the joint from the chronic inflammation already formed in them.

After a fracture, the limb remains weak and stiff for a long period, owing to the atrophy (due to disuse) of muscles, and partly to cicatricial adhesions between the divided structures, as well as contraction of ligaments in the neighbouring joints. These defects and disabilities increase in direct ratio to the length of time that the limb is kept fixed. So regular passive movements should be applied early to prevent the formation of adhesions, and gradual stretching should be encouraged to prevent the same in the neighbouring structures. By and by slow and careful active movements should be tried. The fractured part should be carefully held by the physician and the amount of force should be so given as not to produce any pain in the soft structures.

When active movements are attempted, they should be done without resistance at first; this process should be practised until the fractured parts become altogether painless.

As it is not always easy to fix the two broken ends of a fractured bone in proper proximity to each other, due to infiltrated blood and other tissues lying between the two ends, modern method of early operative treatment of fractures serves the purpose much better and secures a complete fixation by wires, screws or pegs and the restoration of functions in a minimum space of time. As long immobilization of the limb makes its neighbouring joint stiff, the muscles atrophy on account of a long period of disuse. But it must be remembered that these operations should be done, and it is only possible, in cases where strict asepsis could be maintained.

Complications that may arise during the treatment of a fracture.—In old people, the union of a fracture is always delayed. So if such patients be kept in bed for a long time with the limbs

immobilised, as in the case of a fracture of the neck of the femur, hypostatic pneumonia is very likely to take place. Bed sore is very common in these old de-vitalised people who are kept in bed flat for a long time. Firm compression by splints with which the fractured part is fixed, may cause intrinsic atrophy with contraction which is very common in cases of fracture of the fore-arm ; and the effect is manifested in clawed fingers. The wrist sometimes become hyper-extended. In these cases, massage is very useful. If this fails surgical interference is necessary.

Gangrene may ensue in several ways. (1) Due to the action of some direct injury, there may be venous or arterial thrombosis owing to the pressure caused by extravasation of blood in a limb having calcified arteries especially in old people. (2) In the case of a very tight bandage where the circulation of the peripheral portion of the broken limb is seriously interfered with. (3) In a case of compound fracture where the septic infection may spread from the original wound. In each case gangrene may set in.

Compound Fracture.—In compound fractures, there is a communication between the fractured bone and the external air. In this sort of fractures the amount of injury may be small, or a very small portion of the fractured bone may protrude through the wound. There may be slight or severe haemorrhage due to rupture of some neighbouring vessels, also contamination of the wound with dirt outside which may easily be a source of infection of several forms of septic germs to the site of the injury ; Gangrene may follow. Sometimes small isolated fragments of bone are necrosed, and Osteo-myelitis may ensue.

Symptoms.—Along with the fracture of the bone, and laceration of the site of the injury, there is a certain amount of constitutional symptom manifested. There is aseptic traumatic fever, or if there is infection of some distinct form of sepsis, there is inflammation followed by sloughing with marked septic traumatic fever for a week or ten days.

Treatment.—

1. The wound should be rendered aseptic.
2. There must be sufficient and proper outlet for the discharge of the septic material.
3. The wound should be properly washed, and thoroughly scrubbed with some anti-septics.
4. Loose fragments of bone should be removed, as they will cause necrosis. Being separated, they lose vitality, become dead bones and consequently become a source of Gangrene. Proper surgical interference by a competent surgeon is necessary to wash the parts antiseptically, fixing the parts properly, removing the fragments of bone, stopping the haemorrhage and immobilising the limb.

In very serious cases, amputation may be necessary. But I would suggest conservative treatment in amputation cases, and we should try our best to save the limb.

The after treatment of compound fractures is similar to that of a simple fracture. Massage, passive and active movements are good in such cases.

UNUNITED FRACTURES

It is purely surgical, but if the broken pieces of bones be in good position, and can be put on a Paris Plaster casing for about 6 weeks or 2 months, and in the meantime the general health is well attended to by proper hygienic treatment, the bones may get united. If this plan does not succeed, the broken ends of the bone may be lightly rubbed together with slight pressure for 3 to 5 minutes daily so as to encourage a certain amount of local cellular activity ; and then the parts should again be put on a splint. Local congestion of the fractured part may be encouraged by applying an elastic tourniquet above the site of fracture, regularly for an hour or two every day, and then followed by massage and putting on the splint again. If this fails surgical operation should be resorted to.

SPECIAL FRACTURES

Fracture of the Nasal Bones.—It occurs usually in young people as a result of a direct violence by a cricket ball, a punch on the nose or by a stick. The fracture takes place just above the free margins of the bones, and is usually of a transverse nature. In some cases, the fracture may take place higher up at the root of the nose. In this case other bones *e.g.*, the frontal bone or the base of the skull are also broken. In young adults, the cartilage alone may be separated.

Symptoms.—There is a marked depression on the nose due to displacement of bones. Along with the fracture, there may be severe haemorrhage through the nose, also surgical emphysema.

Treatment.—If not promptly and carefully treated, a depressed nose is left due to the consolidation of tissues on the site of the fracture. Immediate replacement of the bones should be effected preferably under an anaesthetic—by pressure of some blunt instrument such as a pair of padded dressing forceps, the blades of which are introduced within the nostril. A pad of Boric lint is then inserted to maintain the position, and a zinc splint moulded to fit the bridge. Lateral displacement can be remedied by mechanical appliances.

FRACTURE OF THE INFERIOR MAXILLA
("Lower Jaw".)

Fracture of the "lower jaw" may be due to some direct as well as some indirect violence. Direct violence causes a fracture on the site of the blow, while an indirect violence like pressure from the sides may compress the bone, leading to a fracture at the middle or a little in front of the mental foramen. The site near the angle of the bone behind the molar teeth is usually liable to be fractured.

The condyle and the coronoid process are also broken sometimes as a result of severe injuries and "Gun shot" wounds,

The fracture of the Lower Jaw almost always gets complicated with sepsis.

Treatment.—Reduction and application of splint. Strict asepsis of the mouth should be maintained.

Union usually takes place in course of six weeks.

If the fragments do not unite, and are forcibly displaced, surgical interference such as wiring the pieces together may be necessary, followed by aseptic treatment.

FRACTURE OF THE RIBS

Fracture of the ribs occurs in two ways—

1. Direct violence.
2. Indirect violence.

Direct Violence.—Blows or wounds causing the broken fragments to be driven inwards injure the pleurae, lungs, liver or the diaphragm.

Indirect Violence—such as the chest of the patient being compressed between the ground and a cart wheel is a very common form of accident in every day life of carters or other pedestrians in the streets. In such cases, the ribs give way at the most convex part near the "angle".

In young people where the ribs are still elastic, the bone does not break completely, and a sort of "green stick" fracture occurs.

Symptoms.—The patient feels a sort of snapping sensation as if something is giving way. There is marked swelling and extravasation of blood at the site of the fracture, also shooting pain which is aggravated by deep breathing. There is crepitus on auscultation which is felt when the patient coughs.

Treatment.—The injured site should be firmly strapped with strips of sticking plaster one and a half to two inches broad, and

thus the movements of the chest will be restricted. The straps are applied from below upwards, and should extend backwards and forwards beyond the middle line, each strap overlapping the preceding one and crossing the direction of the ribs. The application of the strap should be done while the chest is in a state of forced expiration. A moderately thin layer of cotton wool should be applied over the strips of plaster, and the whole chest should be pretty firmly bandaged. When the lower ribs are broken, a tight application of bandage is contra-indicated, as the diaphragm may thereby be irritated and persistent hiccough may ensue.

Union is successful in favourable conditions in course of six weeks to 2 months.

Light massage should be applied for 15 minutes on the site of the injury twice daily to improve the blood supply, and encourage the formation of callus as well the re-absorption of the thick callus which is usually formed as a result of the mobility of the broken fragments of the ribs.

After two months from the date of the accident when the union of the bone has proved to be complete, the following exercises may be undertaken—

Group I.—Exercises Nos. 33, 35, 37, 39, for one month.

Group II.—Exercises Nos. 9, 5, 44, 34. plus Group I. for 6 weeks.

Group III.—Exercises Nos. 7, 8, 32, 18, 19, 19(a), 15. in addition to Group I and II—for 2 months.

Group IV.—All the Groups together, in addition to Exercises Nos. 14 and 15.

FRACTURE OF THE CLAVICLE

Fracture of the Clavicle is a very common occurrence. It is caused by a direct violence, the force being directed to the hand or shoulder *e.g.*, a fall from a horse. It is more common in men than in women. In children, the fracture is not complete, and is always of a "green stick" nature.

The fracture may take place in four different places in the bone.

1. At the Sternal end.
2. At the Greater Convexity.
3. Between the Coroco-Clavicular Ligaments.
4. At the Acromial end.

Treatment.—Fixation of the fractured ends of the bone. "Shayers" method of fixing the fractured ends is very useful. It is as follows :—

A long strip of sticking plaster $3\frac{1}{2}$ inches wide is passed round the arm a little below the axilla as a loop, with the sticky side of the plaster out, and then it is passed round the chest keeping the adhesive sides inwards ; the arm on the fractured side is well pulled backwards and the loop and ends of the plaster are stitched up together. Another strip of adhesive plaster of the same width as the former is applied over the elbow : a small hole is made by cutting the plaster to make room for the olecranon process of the ulna, and by this means the arm is raised, and drawn forwards, so that the hand can be placed on the opposite shoulder.

Fracture of the clavicle when treated early, scarcely leaves any permanent disability. But a small temporary callus may be left at the site of the fracture. Massage should be started to facilitate the absorption of the surrounding thickened tissue.

Union is usually attained in about 4 weeks. But passive or any active movement should not be attempted before that period.

The passive movements should be similar to the movements performed in the voluntary exercises shown below :—

Exercises recommended.—Exercises Nos.—1, 2, 3, 4, 5, 8, 44, and circumduction of the shoulder joint.

After practising these exercises for about three months, the patient may go in for any other ordinary exercise and sports.

FRACTURE OF THE UPPER END OF THE HUMERUS

The fracture is of two types :—

1. Intra-Capsular.—at the Anatomical neck.
2. Extra-Capsular.—at the Surgical neck.

Intra-Capsular.—This is due to a direct injury to the shoulder.

Symptoms.—1. The shoulder becomes swollen by effusion of blood in the joint.

2. Severe pain is experienced on slight movement.
3. Crepitus is felt when the arm is rotated.
4. There is shortening of the arm by about half an inch.

Treatment.—A pad of cotton wool is placed in the axilla, and the arm is bandaged to the body.

Apply massage after a week, and try passive movements after about three weeks.

In severe cases, the arm and the shoulder should be fixed on to a Poroplastic or leather cap tied with a buckle. Massage may be given after eight or ten days, opening every time the buckled shoulder and the arm-cap, and re-adjusting it after this manoeuvre.

Union often takes place in about six weeks,

Passive movements *e.g.*, rotation etc., should not be attempted before six weeks.

Extra-Capsular.—It occurs when the violence is applied directly below the point of the shoulder.

Symptoms.—The fullness of the shoulder is not lost, as the head remains still in the glenoid cavity. There is a depression

just below the fracture. The elbow is directed away from the side, and the axis of the lower fragment is directed inwards and upwards.

Treatment.—Immobilization by placing a pad in the axilla and a shoulder cap ; the arm is kept to the side, and the hand is supported by a sling.

Union occurs in about six weeks, but a great mass of callus is formed round the site of the injury.

Massage and passive movements should be daily performed from the 3rd or the 4th week onwards, opening and re-adjusting the shoulder cap every time as in an Intra-Capsular fracture.

The passive movements should be similar to the voluntary exercises recommended below ; and in addition, passive movements such as rotation of the arm in and out, should be done by the masseur. Number of movements (1 to 20 each).

Exercises recommended :—

Group I.—Exercises Nos.—3, 4, 5, 44, 45, 46 (circumduction of the arm in and out) to be practised for a month and then—

Group II.—Exercises Nos.—17, 18 and 15, in addition to Group I for a month and then—

Group III.—Exercises Nos.—45, 46 plus Groups I and II.

SEPARATION OF THE EPIPHYSIS (UPPER) OF THE HUMERUS

This may occur in patients up to 18 years of age, The fracture usually follows the line of the cartilage.

Treatment.—Reduction by traction of the arm, under an anaesthetic with slight rotatory movements or abduction. The next step is to follow the treatment as in the fracture of the neck of the Humerus.

Exercises.—Passive movements and massage similar to those recommended for the fractures of the neck of the Humerus should be tried

FRACTURES OF THE SHAFT OF THE HUMERUS

It may be due to a violence direct or indirect to the arm, or severe and sudden muscular contraction as in throwing a cricket ball may sometimes cause a fracture of the shaft of the Humerus.

Symptoms.—It occurs usually above the insertion of the Deltoid muscle. If so happens, the upper fragment is drawn inwards, and the lower fragment upwards and outwards. But if the fracture takes place below the insertion of the Deltoid, the upper fragment is drawn outwards, and the lower one inwards and upwards. The lower the line of fracture is towards the elbow, the more antero-posterior the displacement becomes.

Complications.—The common complication is an injury to the musculo-spiral nerve which winds round the shaft of the Humerus near its centre.

Treatment.—Fixation of the arm and the forearm to an "internal angular splint", well padded with a piece of Gooch's splint fixed on the outer side of the Humerus. The limb should be kept to the side in a sling.

From the 2nd day, free movements of the fingers and the wrist-joint should be attempted. For the first ten days from the date of the injury, the fractured part should be kept thoroughly immobilized. The splint should not be removed at all during that period. But slight effleurage may be applied to the fractured area after removing the outer piece of the Gooch's splint very carefully.

The outer piece of the splint should be replaced after the massage.

The elbow joint should not be used for any passive exercise until the angular splint is removed. Passive movements of the shoulder joint should be attempted after a week, but care should be taken to keep the angular splint fixed during the manoeuvre. Rotation of the shoulder joint may be tried after a firm callus is formed at the seat of the fracture.

Active movements of the hand (such as writing) may be allowed after 3 weeks, but very carefully. Within 2 months from the date of the injury no heavy type of work should be attempted.

FRACTURES OF THE LOWER END OF THE HUMERUS

It is sometimes mistaken for dislocation of both radius and ulna at the elbow. But an X-Ray examination will at once reveal the real fact.

Treatment.—The deformity is reduced by traction. The elbow should be kept flexed, and fully supinated. A well padded anterior angular splint is placed at the bend of the elbow, and a straight posterior splint should reach below the tip of the olecranon.

Massage should be started after 10 to 15 days, and as the elbow joint is not involved, passive movements need not be started too early.

Exercises recommended :—

Group I.—Exercises Nos.—3, 4, 5, 44, 48, 49, for about a month.

Group II.—Exercises Nos.—3, 4, 5, 44, 48, 49, plus Ex. No. 14—resting the palm of the hands on the margin of a bench (one and a half foot high),—for about three weeks.

Group III.—Exercises Nos.—3, 4, 5, 44, 48, 49,—using a pair of Dumb-bells (5 to 10 lbs.) in every exercise, plus Exercise No. 14. as described in the book. These exercises should be continued with Exercises Nos.—9, 17, 18, 19, 19(a) for general physical improvement.

SEPARATION OF THE LOWER EPIPHYSIS OF THE HUMERUS

This form of accident is very common in young children. There is backward displacement with a certain amount of lateral deviation.

Treatment.—Fixation by putting the limb on antro-posterior angular splints.

Massage.—Massage and passive movements should be started a week after the date of the injury.

Exercise.—After six weeks, Exercises Nos.—3, 4, 5, 44, 48, 49 should be practised for about two months, and then Exercises Nos.—14 and 15(a) should be attempted.

FRACTURE OF THE ULNA

Fracture of the Olecranon Process (of the Ulna).—It usually occurs as a result of a direct violence. The patient may get the fracture when he falls on his bent elbow. Sometimes severe muscular contraction may cause this fracture. It is usually transverse and runs through the base of the process at its attachment with the shaft. The contraction of the triceps muscle draws the detached fragments upwards and backwards; consequently the bones of the forearm are subluxed forward.

Treatment.—The arm should be put on a straight anterior splint and a figure of “8” bandage applied to bring the fragments in position.

After a fortnight, massage and passive movements should be started very gently.

The passive movements should be as follows :—

1. Flexion and extension of the joint, number of movements (1 to 20).
2. Rotation of the Elbow by pronation and supination, number of movements (1 to 20 in each exercise).

Exercises recommended.—

Group I. Exercises Nos.—4, 11, (pronation and supination while the forearm is bent at right angles to the upper arm), (pronation and supination while the forearm is extended), (circumduction of the elbow joint as shown in Exercise No. 47) to be practised for about two months, and then,

Group II. Exercise No.—14 to be added to the chart.

FRACTURE OF THE SHAFT OF THE ULNA AND RADIUS

(Separately, or both the bones together).

Fracture of the Shaft of the Ulna.—

Treatment.—The arm should be kept midway between supination and pronation. The deformity should be corrected, and fixed on to anterior-posterior splints.

Fracture of the Head of the Radius.—The head of the Radius alone may be broken, or it may be associated with fracture of its outer condyle, or dislocation of the elbow joint. If the subject is young and under 12 years of age, the Epiphysis may get separated, but may not be much displaced if the orbicular ligament be intact. In the case of a complete fracture, the broken pieces may remain intact, only crepitus being felt when the arm is rotated. Sometimes the head remains as a loose body in the joint.

Treatment.—The limb should be put on a splint in the position midway between pronation and supination.

Massage should be started after 4 or 5 days and passive movements after about 10 days.

Fracture of the Neck of the Radius.—The fracture takes place usually between the Bicipital Tuberosity and the Orbicular Ligament. The lower fragment is drawn forwards and upwards by the biceps muscle, and the forearm is rotated.

Treatment.—The arm is fixed, and then supinated. The whole joint is placed on a posterior angular splint with a pad in front of the lower fragment.

Massage should be applied regularly from the 5th or 6th day. Passive movements should not be started before 3 weeks.

Exercises recommended.—Exercises Nos.—3, 4, 11, 47, 48, 49, 50.

Fracture of the Shaft of the Radius.—

Symptoms.—If the injury be above the insertion of the pronator Radii Teres, the upper fragment is flexed, and fully

supinated by the action of the supinator brevis and biceps. The lower fragment is drawn towards the Ulna, and is fully pronated by the pronator muscle.

Treatment.—When the fracture is above the insertion of the pronator Radii Teres, at first the elbow should be flexed and then the forearm and the hand supinated fully, also a posterior splint should be applied. For a few days, the patient should be kept in bed, and the arm laid on pillows. Then the forearm is fixed on to a hollow leathered splint carried across the body with the palm of the hand facing upwards.

When the fracture is below the Pronator Radii Teres—anterior posterior splints should be applied. A slender long pad is also placed in the interspace between the radius and ulna as well as between the limb and the anterior splint. The forearm itself being kept midway between pronation and supination, and the hand kept fully adducted.

Massage should be started early within 5 or 6 days from the accident. The anterior splint being removed carefully, massage should be given for 15 minutes once daily, and the splint replaced again. The elbow joint should be carefully massaged.

Passive movements may be started after one month. Flexion, extension and rotation of the elbow joint should be attempted. Number of movements should be 1 to 20 for three weeks along with the massage. After that, voluntary exercises may be attempted.

Exercises recommended :—

Group I.—Exercises Nos.—3, 4, 44.

Group II.—(a) Rotation of the elbow joint with a pair of small dumb-bells (1 to 5 lbs. each) with the arms extended.

(b) Pronation and supination of the forearm with the elbows bent.

(c) Circumduction of the elbow joint as in Ex. No. 47. All the above Exercises should be practised together.

COLLES'S FRACTURE

(Fracture of the Lower End of the Radius)

This is a very common form of accident. It occurs most commonly in old women. It is due to falls on the outstretched palm with the hand fully pronated and extended. The site of the fracture is about an inch above the wrist. It is usually transverse, and may be central or oblique.

Symptoms.—The hand is pronated, and is in a position of radial abduction, the fingers are a little flexed. The action of pronation and supination is lost. The fragments get impacted, and consequently crepitus is not experienced. There is marked change in the relative position of the styloid process of the radius and ulna. The styloid process of the ulna which in normal condition is about the level of the radius, is seen below that of the radius in case of a Colles's fracture.

Treatment.—Reduction. The patient is seated on a chair. The Surgeon standing in front, grasps firmly the right fractured hand by his right hand, and if the injury be on the left side, by the left, and in form of a "hand shake" makes a counter extension from the flexed elbow; the hand is forcibly extended, and adducted. After reduction, the limb is bandaged on to a padded "Carr's Splint" (a straight splint with a cross bar set at an angle). The splint is placed on the anterior part of the forearm, which rests on the straight part of the splint, the finger grasping the cross bar. A well padded short straight splint is also applied to the posterior part of the forearm. The forearm is now bandaged, the arm is flexed to an angle at the elbow. The forearm is kept midway between pronation and supination, and the limb is now carried in a sling.

Union usually takes place in about a fortnight's time. Massage and passive movements of the fingers may be started from the 3rd or the 4th day. Massage in the form of effleurage may also be given to the site of the fracture after a week. Passive move-

ments and massage of the whole limb may be started after about 10 days. This is best done in the following way :—

The patient sitting on a chair rests his injured arm on the table, a moderately soft cushion is placed under the arm. A side cushion is also placed on the flexor side of the forearm which is kept midway between supination and pronation. Now take off the posterior splint carefully, and start applying effleurage with slow rhythmical strokes starting above the site of the injury right up to the shoulder ; continue this for about 10 minutes. Then start the same sort of strokes from the tips of the fingers, and carry them up to the shoulder for about 5 minutes. After about 10 days, massage can be given to the whole limb, by carefully taking the splint away. The Surgeon should carefully support the fractured part while the assistant smartly but carefully removes the splint.

Apply massage to the extensor surface first for about 10 minutes. Now turn the hand in a position midway between pronation and supination, and treat the flexor surface with a similar type of massage.

After massaging the forearm for about 10 days more, try to give 2 or 3 small passive movements of flexion and extension to the wrist joint. After this manoeuvre, put the limb on to the splint again. Continue this sort of treatment for about 3 weeks, during which period there is union sufficiently strong so as not to require the splint, and the limb may be kept in a position midway between pronation and supination in a gutta-purcha or leather support for a fortnight more, before it is safe to use the arm freely. After the splint is taken off, general strengthening massage and some light active movements of the limb may be encouraged.

Exercises recommended.—

Group I.—Exercises Nos. 11, 12, 48, 49, 50 for a fortnight.

Group II.—Rotation and circumduction of the wrist joints (both hands) with a pair of light Indian clubs

(weight 1 lb. to 3 lbs. each). Number of movements (5 to 50 each) plus Group I exercises for a month,

Group III.—Exercises Nos.—3, 4, 9, 14, 15, in addition to Groups I and II.

Massage should be continued every day for 15 to 30 minutes after the exercise.

FRACTURE OF THE METACARPAL BONES AND THE PHALANGES

These bones are fractured usually by direct violence. The 3rd and the 4th fingers are commonly broken, and the fracture is usually of a transverse type.

Treatment.—Reduction by traction. Extension is difficult to persist. Usual treatment is immobilization of the part, and for the phalanges, a small zinc splint moulded along the front of the fingers should be used.

Massage with light friction and kneading is imperative from the 1st week.

FRACTURE OF THE LOWER EXTREMITY

FRACTURE OF THE PATELLA

This is often caused by a direct violence to the Patella or sometimes by violent extension of the quadriceps extensor muscles of the thigh, such as is caused by suddenly kicking a football. The bone is usually broken transversely.

Treatment.—Fixation of the limb by applying a long back splint with a comfortable soft pad behind the knee joint. The patient should be asked to lie on his back. On the top of the Patella a leather knee cap is fixed and buckled up.

Massage should be started very carefully. It may be done by removing the knee cap, the back splint being kept intact, stroking the seat of fracture with the tips of the fingers, and light

effleurage being given to the surrounding parts. Kneading should be started from the thigh and finished at the ankle. The quadriceps extensor muscle should be treated with very slight strokings and light frictions on the Patella. During all these manoeuvres, the Patella should be held very carefully in position by the left hand, preferably by another assistant.

It is better if the broken pieces of the Patella are joined together by "wiring" by a Surgeon, before the splint is applied. In this case massage should be started a little later *i.e.*, after the wound is thoroughly healed. Proper attention should be given to the massage of the Ilio-tibial band. The ankle joint and the toes may be given passive movements from the 3rd day. After a fortnight, the Patella should be given a few (passive) lateral movements, while the limb is quietly lying on the back splint. Again holding the Patella by the left hand, make some passive flexions of the knee joint at an angle of about 5° and continue this sort of passive flexion every day until an angle of 45° is attained. After this, allow some slow active movements particularly of the quadriceps extensor muscle.

The voluntary movements recommended are as follows :—

About 3 weeks after the healing of the wound caused by the surgical operation of wiring, or a month after the accident when it is proved that the broken pieces of bones have virtually united by the formation of a permanent callus ; the patient may practise the following exercises.—

Continue Exercise No. 5 for about a fortnight, gradually increasing the range of flexion and extension upto their normal limit.

Then in addition to the above exercise, start Exercise No. 52.
Number of movements (3 to 50).

After practising the above exercises (51 and 52) and walking slowly for about 3 weeks, go through Exercise No. 53 with a weight tied at the ankle or at the foot. The weight used, should be (1 lb to 10 lbs.) Number of movements (3 to 50),

After going through all the above exercises, the patient may now walk briskly or practise jog-trot and as well as go upstairs increasing the number of steps every day.

FRACTURE OF THE NECK OF THE FEMUR

1. Intra-Capsular.
2. Extra-Capsular.

Fracture of the neck of the Femur—(Intra-Capsular).—

This sort of fracture is very common in old people, and more in women than in men.

Causes.—In old people, there is an atrophic change taking place in the neck of the femur. The compact bony tissue ensheathing the Cancelli gets thinned, and the spaces between these Cancelli are enlarged and become filled with soft fat. The processes of thick cortical substance running from the Lesser Trochanter to the lower part of the head of the femur get atrophied. The neck of the femur itself becomes more horizontal; and the head remains in a lower level than before. The neck of the femur in such a condition, is too weak to stand any violence, and a slight stumble or a fall as stripping upstairs may cause the fracture.

Symptoms.—In some cases, there may be slight impaction. The upper end of the neck may be driven into the loose cancellous tissue of the head. The lower fragment is drawn upwards by the contraction of the Glutii, Quadriceps Extensor, and the Hamstring muscles, and is rotated backwards and outwards. The fractured end looks directly forwards.

Fracture of the neck of the Femur (Extra-Capsular).—

The Great Trochanter is often involved in an Extra-Capsular fracture of the Femur. It is often of a comminuted type, and the displacement is much the same as in the Intra-Capsular type. It is usually the result of a direct violence,

The differential points in the signs and symptoms of the Intra and the Extra-Capsular fractures at the neck of the Femur.

Intra-Capsular Fracture

Extra-Capsular Fracture.

- | | |
|---|---|
| (a) Pain, Bruising and swelling present. | (a) Pain, Bruising and swelling more marked. |
| (b) Crepitus present in the un-impacted fracture. | (b) Crepitus present in the un-impacted form. |
| (c) Eversion marked. | (c) Eversion marked. |
| (d) Loss of power less marked. | (d) Loss of power more marked. |
| (e) Shortening of the limb slight. | (e) Shortening of the limb marked (1 inch to 3 inches). |
| (f) No thickening of the great trochanter. | (f) Marked thickening of the great trochanter. |

The position of the Great Trochanter is a very important landmark in the diagnosis of the fracture of the neck of the Femur. In this fracture, the Great Trochanter is raised above its ordinary level, and everted. It gets close to the anterior superior spine of the Ilium and to the middle line of the body, also rotates in the arc of a circle smaller than that in the normal condition.

The chance of healing depends greatly on the general condition of the patient. There is usually a chance of bony union which may take place in about three months time.

Treatment.—In the case of a patient with a good physique and in sound health, bony union is expected if he is kept in bed for about eight weeks in a recumbent posture, having the limb fixed to a "Liston's long splint" with extension of the limb effected by weight and pulley. Carefully padded poroplastic foot pieces should be placed on either side of the ankle so as to protect it from pressure. After six weeks, the pelvis should be encased in plaster of paris; and the patient may be allowed to get about on crutches.

In very old and weakly patients, long confinement in bed is harmful. In cases like this, the limb is put at rest for about a

week in the most comfortable position, supported by pillows and sand bags. Massage should be applied to keep up tone in the muscles. When massaging the inner side of the thigh, the pressure should be very light as there is chance of a blood clot being set free.

Care should be taken not to dis-impact fracture of the neck of the femur in old people.

Massage, also passive and active movements of the toes and the ankle joint are advisable, but they should be started early, and done very carefully.

After keeping the limb fixed on a splint, or ensheathing it in a poroplastic casing for about three months, the following passive movements may be tried.—

- (a) The patient lies on his back on the floor, as shown in figure 109. The masseur lifts the patient's affected leg with a grip on the ankle, or by holding the foot. The range of the lift should be gradually at right angles to the trunk. It should then be lowered to the original position (flat on the ground). Number of movements (1 to 20).

After practising this for about 3 weeks, another type of passive movement may be tried along with the movement (a).

- (b) The patient lies on his face as shown in figure 84. The masseur now holds the patient's foot by the heel, and puts the other hand below the knee joint *i.e.*, under the Patella so as to keep the knee joint in an extended condition. He now lifts the whole lower limb of the patient upwards, making an angle of a few degrees with the trunk behind at the hip. Number of movements (1 to 20). Massage being carried on for fifteen minutes after the Passive movements every day.

After trying massage and passive movements as mentioned above for about three weeks, the patient may go in for the following voluntary exercises :—

Group I.—Exercises Nos.—9, 40, 20 and walking.

Group II.—Exercises Nos.—19, 42, 42(a), 43 in addition to Group I.

Massage should be continued regularly after the exercise. The patient should be very careful as regards walking.

In some cases where the application of splint and poroplastic treatment fail, open operation (the broken pieces being fixed by proximal pegging) may be performed by expert surgeons even one year after the accident with success.

Massage is imperative in these cases as soon as the wound heals up.

Passive movements and voluntary exercises.—Similar as in the case of ordinary non-operative treatment, are applicable after the wound is healed up.

FRACTURE OF THE FEMUR THROUGH THE GREAT TROCANter AND ALSO NEAR THE GREAT TROCANter

Both are successfully treated by fixing the limb on to a "Hodgen's splint".

Massage and after treatment are similar to that of the fracture of the neck of the Femur.

FRACTURE OF THE GREAT TROCANter

This sort of fracture is not very common. It is caused by a direct violence. The great Trocanter in some cases gets simply separated from the long bone without any solution or continuity of the Femur. In children, the separation takes place along the Epiphysial junction.

Treatment.—Fixation is performed by an operation consisting of pegging the Trocanter with the shaft, and fixing on to a long splint as in the fracture of the neck of the Femur.

Massage, passive movements and voluntary exercises are similar to those of the fracture of the neck of the Femur.

FRACTURE OF THE SHAFT OF THE FEMUR

It is a very common occurrence. The centre of the bone is usually fractured, the lower end being much more affected than the upper. The upper end is fractured usually by an accident, while the lower one by direct violence. The middle of the bone may be fractured either by a direct or an indirect violence.

Treatment.—In case of a fracture in the upper third, the upper fragment is too short to be kept in a long splint. The fracture is reduced by flexing the leg on the thigh, and putting the limb on to a "Macintyre's" splint with a long thigh piece and a small Gooch's splint each to the anterior, inner and outer side of the thigh at the site of the fracture, extension being given with a wooden foot piece as usual. Union is expected in six weeks' time. After 15 days, the site of the fracture may be massaged for 30 minutes daily by carefully removing the Gooch's splint and readjusting the strips of the splint.

As regards massage of the limb, strokes of effleurage should be given; the strokes being carried upwards and downwards along the whole length of the limb for 10 minutes.

Massage of the knee joint and the groin should be started very early, and should be done for about 5 minutes every day (Refer to Introduction Pages XIII and XIV). Passive movements of the ankle and the toes may be started after a week from the date of the accident. These movements should be of the nature of flexion and extension of the toes, and that of the ankle forwards and backwards also sideways, as well rotation in and outwards.

After six weeks, passive movements of the knee as well as of the hip joint may be performed daily, along with the massage (for 15 to 30 minutes).

Voluntary exercises may be attempted after three months. The patient may start walking with the aid of crutches. Other exercises recommended:—

Group I.—Exercises Nos.—13, 26, 42, 42(a) for about 3 weeks.

Group II.—Exercises Nos.—29, 30, 30(a) and 31, 31(a), plus Group I.

Fracture in the Middle Third.—After manipulation, the limb is fixed on to a long back splint with Gooch's splinting on the inner, outer and the front side of the thigh, at the site of fracture. Extension is maintained at the lower end, by strips of sticking plaster and weight well adjusted.

Exercises.—Similar to that of the fracture of the Upper third.

Fracture in the Lower Third.—After manipulation, the limb may be fixed on to a Macintyre's Splint with a long thigh-piece.

FRACTURE OF THE LEG

Fracture of the Tibia.—It occurs in three different parts of the bone.

(a) Fracture at the Upper End of the Tibia.

(b) Fracture at the Middle—the shaft of the Tibia.

(c) Fracture at the Lower End—the Inner Malleolus.

Fracture of the Tibia at all the three above mentioned sites are caused by direct violence.

Fracture of the Upper End of the Tibia :—It is caused by a direct violence with great force. It often becomes comminuted. It may be caused by a fall on the heel when a "T"-shaped fracture results. The tuberosities get broken, and the upper end of the shaft gets impacted into either of the two tuberosities or in both.

Treatment.—Fixation on to a Macintyre's splint with the knee bent. Massage should be tried from the 10th day. Passive movements should be attempted after 6 weeks, and active movements after 3 months.

Exercises.—The patient sitting on a chair, flexion extension and circumduction of the leg should be practised, and massage should be applied in the form of Friction, Effleurage, light Tapotement, also Vibrations for one month ; then walking should be

encouraged, at first with the aid of crutches for 3 months, and then without any help.

Fracture of the Shaft of the Tibia.—There is very little displacement as the fibula acts like a splint. But the lower end of the upper fragment is tilted forwards by the contraction of the quadriceps extensor.

Treatment.—The limb is fixed on to a back splint for a few days. Massage should be carefully applied. When the swelling has gone down, put the leg in a plaster of Paris casing for 6 weeks, and then remove the plaster of Paris casing, and fix the leg up to a back splint, with Gooch's splints placed sideways. Massage should be continued. After 6 months, passive movements may be tried, followed by massage. After another 3 months, walking may be encouraged, with the help of crutches at the out set.

Surgical interference such as pegging of the inner malleolus on to the lower end of the Tibia gives good result. After the wound is healed, massage and walking with crutches should be carried on for 6 weeks, and then walking without any help may be encouraged.

Treatment.—The limb is fixed on to two lateral splints. The union is not always satisfactory. Fibrous union may often follow,

Exercises.—

Group I.—Exercises Nos. 51, 52, 52(a), 52(b), 54 followed by slow walking for three months.

Group II.—Exercises Nos 16, 13 plus Group I. for six weeks.

Group III.—Exercises No. 15. plus Group I and II.

Fracture of the Lower end of the Tibia.—It is the fracture of the Internal Malleolus. It is caused by a direct violence. There is comparatively little displacement.

Treatment.—Application of lateral splints. Fibrous union usually follows.

Exercise.—Similar to that mentioned under fracture of the shaft of the Tibia, but special stress should be put on Exercises Nos. 52. 52(a) and Ex. No. 15(a) should be added.

FRACTURE OF THE FIBULA

It is caused by direct violence. The displacement or the deformity is not much marked, but the patient complains of local pain at the site of the fracture.

Treatment.—As the bone is pretty thin and long, so after an accident, proper apposition of the broken ends would be very difficult; so fixation under X' Ray is advisable. The leg should be put in a plaster of Paris casing.

POTT'S FRACTURE

It is the fracture of the Fibula at the ankle joint. It is usually caused by the patient slipping on the inside of his foot.

The internal lateral ligament of the ankle joint gives way by a sudden abduction of the foot. The fibula bends, and breaks at its weakest spot. The foot is rotated outwards. The astragalus is forced against the external Malleolus. The heel is drawn upwards. The toes point downwards.

Treatment.—Reduction by traction, and fixation under X' Ray. The knee is flexed, and thereby the tension of the calf muscles is relieved. Then the traction is made on the foot. During the application of the splint, care should be taken so that the foot is kept at right angles to the leg, the heel does not project too much backwards, and the inner surfaces of the Patella, internal Malleolus and the Great toe all lie in the same line. In simple cases of Pott's fracture, application of "Dupuytren's splint" serves the purpose all right. It is like a Liston's splint but is of a smaller size. It is well padded, and is placed on the inner side of the leg, extending from the knee to a little below the sole of the foot. The patient should lie on the sound side when the splint is being applied. The ankle is fixed to the splint by a strap three inches broad, and

the upper part of the leg is also fixed with a similar substance as shown in the figure,

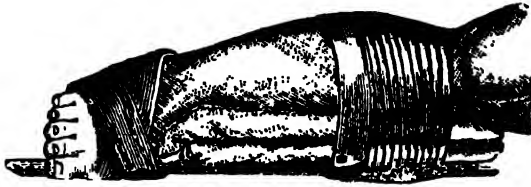


Fig.—“Dupuytren’s” splint applied.

As soon as possible, the leg should be in a plaster of Paris casing (in parts), and bandaged.

Massage should be started early. The pieces of the plaster of Paris casing and the bandage should be removed every time before the massage, and re-applied after the procedure. Massage with light effleurage may be started first, and this should be given for five minutes every day with slow and rhythmical strokes, starting above the site of the injury, and carried over the thigh upwards towards the groin. Then begin the strokes on the dorsum of the foot, carry them lightly and carefully over the site of the fracture upwards towards the thigh. From the 3rd day since the massage is started, begin the strokes from the upper part of the thigh down to the sole of the foot, and continue the movement alternately above downwards and below upwards for about five minutes. The muscles of the thigh and the foot require slight kneading after the effleurage. The whole period of massage, effleurage and kneading should take about half an hour daily.

Passive movements may be given to the toes from the very beginning.

Passive antero-posterior movements of the ankle may be given after a fortnight from the date of the accident.

After about three weeks, effleurage and kneading may be given to the calf muscles. The knee joint may be given some passive movements such as flexion and extension, and the ankle joint some very careful inversions and eversions.

After six weeks, free voluntary movements may be allowed, and they should be as directed below.

The patient sitting on the bed should extend his leg beyond its lower margin and then—

- (a) Flex and extend his legs with his knee joint as the fulcrum. Number of movements (3 to 50).
- (b) Flex and extend the ankle joint, with the leg hanging by the side of the bed. Number of movements (3 to 50).
- (c) Do some eversion and inversion movements of the ankle joint. Number of movements (3 to 50).
- (d) Finally attempt Exercises Nos. 52, 52(a).

Massage should be given for 10 minutes to the ankle joint and the site of the injury after the exercise.

After about two months, the patient may be allowed to walk with crutches, and after another three weeks, he should try walking without any aid.

Massage should be carried on for about a month or two after the patient has started walking, care being taken specially to increase the strength of the extensor muscles of the thigh and the leg, also the muscles of the sole of the foot, so that flat foot may not result.

CHAPTER XIII

INJURIES OF JOINTS

Sprains.—These are caused by a direct or indirect violence suddenly applied to a joint. They occur occasionally in everyday life when walking, or in sports and games such as Footballs, Wrestling, Boxing and so forth

Morbid Anatomy.—The synovial membrane is stretched or even swollen. The partially detached portion of the membrane gets tucked inwards. In some cases, the ligaments get torn, and in severe cases, they become severed from their attachments to the bones. The sprain affects one side of the joint, and if the force of the injury be very great, the blood vessels of the affected side often get ruptured, causing more or less hæmorrhage into the surrounding tissues or into the articular interspace. Inflammatory effusion takes place in the joint. If neglected, or improperly treated, the pain lasts for a long time, so also weakness. Adhesions are formed later, due to the fibrous change in the torn ligaments. People predisposed to tuberculosis, may get tuberculous joint after a severe sprain in the joint. Osteo-arthritis is also a common sequela in a neglected case of sprain.

Treatment.—Immediately after the accident, the joint should be pretty firmly bandaged, and padded on a splint for support, raised, and given perfect rest. Evaporating lotions should be applied or the joint may be packed in ice in order to limit the amount of effusion.

If the injury be slight, the pain passes off in a few days. Massage should be given, and the joint kept under an elastic bandage when the limb is used ; but if the injury be severe, the part should be kept at rest for a longer period till the pain and tenderness disappear altogether.

When the pain disappears, the joint should be massaged with some embrocation, and occasionally douched alternately with hot and cold water, then passive followed by active movements, and later on some resistant exercises should be encouraged.

PENETRATING WOUNDS OF JOINTS

In penetrating wounds of joints, there is often an escape of synovial fluid along with blood. But if the punctured wound be very small, the synovial fluid may not escape. If there is no infection, the injury causes only simple synovitis which soon heals up. If there be infection of micro-organisms (usually *Streptococcus*). Acute Arthritis ensues, and the joint is disorganised.

Treatment.—If there is no sepsis, the treatment should be for simple synovitis. But if the joint becomes septic, treatment should be as in Acute Arthritis.

DISLOCATION OF JOINTS

In a dislocation, the articular surfaces of bones become separated, and remain in a faulty position.

Causes.—A dislocation may be caused by an injury resulting in a forcible displacement of one of the bones forming an articulation.

There may be dislocations having a congenital origin, and in some cases, the dislocation is pathological.

Treatment.—The treatment of dislocation is purely surgical, so it is not fully dealt with here.

General Treatment.—The reduction of the displaced bones should be undertaken without delay. If the dislocation be not reduced for a long time, local fibrosis renders the reduction very difficult in future, and undue force applied to the part breaks the adhesions, also the vessels and nerves in the neighbourhood are endangered. In acute cases, manipulation and fixation on a suitable splint is necessary, cooling lotions should be applied, and rest given to prevent inflammation. Sometimes, extensions are required. These procedures are all purely surgical.

As soon as the joint becomes free from pain after some reasonable amount of rest (an extension being already given), it can be allowed certain special passive and later on active movements to make the joint useful in future. Massage is a very useful procedure, and the earlier it is started, the better.

Congenital Dislocation.—The so-called congenital dislocation of a joint is a misnomer. As a matter of fact, the condition we notice after the birth of the child is an error in development.

Congenital Dislocation of the Hip.—It is more common in girls than in boys. The defect is not noticed before the child begins to walk.

Symptoms.—The deformity is usually unilateral, but sometimes it is bi-lateral. The leg is shortened when the child walks, it is flexed on the pelvis due to the traction of the Ilio-psoas muscles,

resulting in Lordosis in the back to keep the body in an erect position. In one sided cases, Scoliosis is very marked. The head of the femur being displaced from the middle line near the perineal region, a central gap is felt between the thighs. Due to muscular contraction caused by the adductor muscles, the lower end of the femur is markedly adducted. When both legs are affected, a scissor leg results

Treatment.—The treatment should be adopted early. The head of the bone should be placed in its socket by manipulation, and kept there in the form of abduction. It should be kept in that position by fixation, and a pressure is made inwards over the trochanter with a screw apparatus. This treatment should last for 6 to 12 months.

Lorenze's method is the most successful in the treatment of congenital dislocation of the hip. It is the best for children between the ages of 3 and 5 years. It is as follows :—

The head of the bone is first drawn down to the level of the Acetabulum. The adductor muscles get contracted, and require kneading. The head of the femur is then replaced in the Acetabulum. The limb is now completely flexed, and then with a little force abducted, extended, and everted. Then the limb is put up in a plaster of paris casing from the Pelvis to the knee in a position of abduction and slight eversion and the leg flexed. This position should be maintained for 10 to 12 weeks, and the part should be X' Rayed to see whether the bone has slipped out or not. After three months, the plaster of paris casing may be removed, and the bone kept in a less abducted position than before. A fresh casing of plaster is applied with the limb kept in this new position, also outward rotation along with extension is maintained. As soon as possible, the child is encouraged to walk with the limb in this position of abduction. Crutches are required at first, but the patient should part with them soon. The Paris-plaster casing is required for about six months. Massage is very efficacious after the removal of the plaster casing.

In cases of older children, surgical operation may be useful.

DISLOCATIONS (Traumatic)

SPECIAL DISLOCATIONS

² **Forward Dislocation of the Lower Jaw.**—It may result from sudden muscular action caused by opening the mouth during yawning, or from a sudden blow on the chin when the mouth is widely open, in laughing, or attempting to bite. Sometimes careless and inexperienced hands of unqualified dentists may cause this dislocation when drawing out a tooth. This sort of dislocation becomes chronic in some cases, and occasionally recurs.

Treatment.—Reduction. Depress the condyle below the level of the Eminentia Articularis. Now the Masseter, Internal-Pterygoid, and Temporal muscles will draw it backwards automatically into the glenoid cavity. When reduced, the jaw is kept at rest by means of a four-tailed bandage for a few days. From the third day, local massage of the joint is necessary.

DISLOCATION OF THE CLAVICLE (Sternal End)

This dislocation may occur in three different forms—

- (a) Upwards.
- (b) Forwards.
- (c) Backwards.

(a) **Upward dislocation of the Clavicle.**—It is a very rare occurrence. The head of the sternal end of the Clavicle is felt in front of the Trachea.

Treatment.—Reduction—Place a pad in the axilla, and press the arm over it, with the elbow elevated, and bandaged to the side.

(b) **Forward dislocation of the Clavicle.**—The end of the Clavicle is pushed forward, and lies on the anterior surface of the manubrium. The ligaments of the joint are torn but almost always the intra-clavicular ligament is intact.

Treatment.—Reduction—The surgeon should place his knee against the spine between the Scapulae, draw the shoulders at the

same time backwards, and keep the elbow on the affected side in front of the mid-axillary line. This form of dislocation of the clavicle usually recurs. In order to prevent the recurrence, a pad should be placed over the end of the bone, by a figure-of-8 bandage. The point of the shoulder is pushed outward, by placing a pad in the axilla, and the arm is bandaged to the side. The patient should be given rest preferably in bed for a few days. Rest will give the torn ligaments some chance to re-unite,

(c) **Backward Dislocation of the Clavicle.**—It is rarely met with.

Symptoms.—The head of the Clavicle lies behind the upper part of the Sternum near the origin of the Sterno-hyoid and Sterno-thyroid muscles. All the ligaments are torn. The shoulder is pushed as it were forward to some extent. The movements of the head and neck are painful. There is some difficulty in breathing and deglutition, caused by pressure of the head of the Clavicle upon the trachea and oesophagus. There is congestion in the brain causing partial loss of consciousness due to pressure on the blood vessels of the neck.

Treatment.—Reduction is effected by extension of the shoulders backwards, and keeping the shoulders in that extended condition by fixing them with two handkerchiefs—Two large handkerchiefs folded double, and rolled into bands, are placed vertically, one over each shoulder and under each axilla; each is knotted behind, the ends being firmly tied to the opposite handkerchief across the middle line.

DISLOCATION OF THE OUTER END OF THE CLAVICLE AT THE ACROMIO- CLAVICULAR JOINT

Symptoms.—The Acromion process of the Scapula is forced either above or below the outer end of the clavicle, but usually below. The dislocation is usually caused by some violence directed to the scapula,

Treatment.—Reduction. But recurrence is very common in the form in which the scapula is driven downwards. After reduction, the elbow is flexed to a right angle, pads are placed over the Acromion and under the elbow, a broad strip of sticking plaster is applied to the Acromion and the elbow to keep the bones in position. An extra strip of bandage is passed from the elbow round the opposite side of the chest.

If the displacement persists, surgical interference such as wiring together of the bones is necessary.

General Treatment of Dislocation of the Clavicle.—After reduction, the patient should be given rest, preferably in bed for a few days, as rest will give the ruptured ligaments some chance to re-unite.

After 3 or 4 days, regular massage and electric treatment are useful.

After massaging the joint for about a fortnight, passive movements should be resorted to.—Imitating Exercises No.—3, 4, 5, 44, 45, and 46.

After massage and passive movements for about another 2 weeks, voluntary movements should be attempted.

Exercises.—(Voluntary movements).

Group I.—Exercises Nos.—3, 4, 5, 44, 46 for one month.

Group II.—Exercises Nos.—17, 18, 19, 20, plus Group I. for one month.

Group III.—Exercises Nos.—6, 7, 8, 8(a) plus Groups I and II.

Group IV.—All the Groups I, II and III plus Ex. No 14.

DISLOCATION OF THE SHOULDER JOINT

This dislocation occurs much more frequently than dislocation of other joints.

Causes of the greater frequency of occurrence :—

(1) Greater size of the head of the Humerus in relation to the Glenoid Cavity.

- (2) Comparative shallowness of the glenoid cavity.
- (3) The laxity of the capsular ligament.
- (4) The possibility of wide range and great force of movements.
- (5) The exposed position of the shoulder.

Symptoms.—(1) The shoulder looks flattened, due to the displacement of the head of the Humerus inwards.

(2) The Acromion process becomes unusually prominent, and a hollow is felt below it.

(3) The glenoid cavity is empty.

(4) The vertical measurement round the axilla is increased in all the varieties ; but either the anterior or the posterior axillary fold is found to be lowered.

Types of dislocation of the shoulder named after the situation of the head of the Humerus in relation to the other structures :—

- 1. Sub-glenoid
- 2. Sub-corocoid
- 3. Sub-clavicular
- 4. Sub-spinous

Treatment of Dislocations of the Shoulder.—Reduction by manipulation under anaesthesia. Very careful administration of anaesthetics is necessary. When, thorough anaesthesia has established, there is full relaxation of the muscles surrounding the joint, so the reduction becomes much easier, and slight rotatory movement fulfils the purpose.

∴ Extension is required to counteract the tension of the surrounding muscles and ligaments.

After-Treatment.—The arm should be put on a sling with a big triangular bandage. Lead lotion should be applied for a day after the reduction of the dislocation. Later Antiflogestine should be applied for a day or two. Then massage and rest for another

two days. When local pain in the joint has subsided, passive movements and massage may be carried on for about a fortnight. Then gradually active movements may be allowed. Resistant exercises or exercises with weights requiring strain should be avoided for nearly two months.

Exercises recommended.—

Group I.—Exercises Nos.—3, 4, 5, 6, 44, 8, 9, 23, for a fortnight, then

Group II.—Exercises Nos.—18, 20, 32, 45, 46 may be added to the chart.

After these two groups have been practised for two months, the patient may go in for—

Group III.—Exercises Nos.—14 and in addition any other strenuous exercise practicable.

DISLOCATION OF THE ELBOW JOINT

It may be caused by a direct or an indirect violence. It occurs practically in young people. Rapid swelling following the accident makes the diagnosis difficult. An X-Ray examination removes the suspicion. An easy method for diagnosis whether there is any suspected dislocation in the elbow joint before much swelling and pain supervene, is to ask the patient if he could perform a movement like taking a bit of food stuff from the table, and put it into his mouth without lowering the head. If he could do this, it is clear that there is no injury like dislocation or fracture in the joint. In case he cannot do so, some injury is to be suspected and careful diagnosis should be made, as well as necessary steps taken.

Types of Dislocation at the Elbow joint.—Dislocation of both radius and ulna may take place, and the displacement may be in three different ways :—

1. Forwards.
2. Backwards.
3. Lateral.

Forward Dislocation of the Radius and Ulna.—It invariably results from the fracture of the olecranon process of the ulna. It occurs when the arm is in a condition of flexion and the patient falls backwards on the point of the elbow.

Symptoms.—The length of the forearm is increased about an inch, and the arm remains in a flexed condition.

Backward Dislocation.—This is a very common type of dislocation resulting from a dislocation of both Radius and Ulna at the Elbow joint. In this, either the olecranon or the coronoid process and usually the coronoid process is fractured, and detached. Crepitus is marked during manipulations. The forearm is semiflexed, and is midway between pronation and supination. The displaced piece of bone forms a marked lump at the back of the joint. The tendon of the Triceps muscle is prominent at the top of this lump, and a depression is felt under

its tendon. The lower end of the Humerus projects in front of the joint. The measurement from the Acromion process to the external condyle remains unchanged, and from the condyle to the styloid process of the radius is shortened, while that of the condyles from the olecranon process is increased.

Lateral Dislocation of the Radius and Ulna.—

This sort of dislocation occurs occasionally, and is almost always incomplete.

Dislocation of Ulna alone.—It occurs very rarely, and is always in a backward direction.

- Treatment.**—1. Reduction.
 2. Fixation.
 3. After-Treatment.

The best method of reduction is that advocated by Sir Ashley Cooper.—The patient sits on a chair. The Surgeon puts his foot on the same chair, holds the patient's forearm on and above the wrist, presses it backwards with his (surgeon's) knee in the bend of the elbow of the patient, against the lower end of the Humerus ; and finally bends the forearm slowly, but forcibly.

Dislocation of the Radius alone.—It may occur in three different ways :—

1. Forwards.
2. Backwards.
3. Outwards.

Regarding occurrence, the most common form is the forward dislocation. Then comes the next form the Backward dislocation. The outward dislocation is very rare.

Forward Dislocation of the Radius.—The head of the Radius slips into the hollow above the lower end of the Humerus.

Symptoms.—The head of the Radius is felt in this cavity when the forearm is rotated, there is a hollow felt behind the external condyle of the Humerus. The forearm is midway between pronation and supination, and is moderately flexed. Supination

cannot be fully accomplished. When the arm is extended, there is marked swelling at the anterior part of the joint. The orbicular ligament is usually ruptured.

Causes.—This is a very common form of dislocation of the elbow joint. It occurs when the patient falls on his hands, the forearm being in a state of extreme pronation.

Treatment.—**Reduction.**—The forearm should be kept flexed at right angles, and traction applied by holding the forearm at the wrist with pressure over the head of the radius.

Fixation.—As the deformity may recur due to the concomitant rupture of the orbicular ligament, the limb should be fixed to a splint for about a month with the forearm flexed, and a small pad placed in front and above the head of the Radius.

Massage should be started after rest for about 3 days (for 15 to 30 minutes every day), and the limb be fixed on to the splint again after the massage. Passive movements should be started after 3 weeks. Then after about six weeks, active exercises may be attempted.

Exercises recommended.—Exercises Nos.—3, 4, 50, 47.

Backward Dislocation.—It is less common than the forward type.

Symptoms.—The forearm is flexed and is pronated. If unreduced, it does not give rise to much inconvenience.

Outward Dislocation.—It is a rare occurrence.

DISLOCATION OF THE WRIST JOINT

This accident may occur in two forms :—

1. Forwards.
2. Backwards.

The Backward Dislocation is comparatively more common than the Forward one. In this, the Radius together with the hand is dislocated from the lower end of the Ulna.

Causes.—This dislocation of the wrist is caused when the wrist along with the forearm is pronated forcibly.

Treatment.—Reduction by manipulation. Rest should be given, and the limb fixed on a splint for 3 to 4 days—also soothing lotion applied.

Massage should be started early. It should be done for 15 to 30 minutes daily, and the joint be put on the splint again after the massage, for a period of about a fortnight. Then passive movements and massage should be attempted for about another fortnight. After six weeks, light active exercises of the joint may be encouraged.

Exercises recommended.—Exercises Nos.—11, 12, 48, 50, 49.

DISLOCATION OF THE HIP JOINT

This occurrence is not very common. But when it occurs, it becomes very serious.

Causes.—It is always caused by an indirect violence. It occurs when a force is applied to the feet or the knees, or if the leg be fixed to the back forcibly. It is rare after the age of 40 or 50 as after that age, fracture of the neck of the femur is much more common than a dislocation of the hip joint.

Types of Dislocation of the Hip Joint :—

1. Dorsal.
2. Sciatic.
3. Obturator.
4. Pubic.

Dorsal Dislocation.—

Signs & Symptoms.—The head of the femur is pushed on the Dorsum Ilii, above and behind the acetabulum, also definitely above the tendon of the obdurator internus muscle. The capsular ligament and the Ligamentum Teres are torn. The Ilio-femoral ligament remains intact. The Great Sciatic nerve is usually compressed. A distinct depression is felt in the upper

part of the "Scarpa's Triangle". The Great Trochanter gets close to the anterior superior spine of the Ilium. Consequently, the Ilio-tibial band is relaxed. As a result, there is considerable shortening of the limb. The leg gets into a position of flexion, adduction and inversion. The knee is half flexed, the heel is slightly raised, and the great toe rests on the instep of the other foot.

Treatment.—Reduction.—The patient lies on the floor, and is put under anaesthesia. Manipulation is performed according to the method of "Bigelow"—The leg is lifted up, it is flexed on the thigh and the thigh on the abdomen, and the knee extends beyond the middle line of the body. The patient is kept in that position for a few seconds. Now the whole limb is markedly rolled outwards, and brought down quickly into a position of extension, and at the same time placed parallel with the other.

Sciatic Dislocation.—In this dislocation, the head of the Femur is driven on the Dorsum Ilii, and is located below the Obturator Internus tendon.

Causes.—It may occur from an extreme flexion of the lower limb while it is in an abducted position, or from a forced abduction.

Symptoms.—The amount of injury to the surrounding structures is almost the same as in the dorsal variety.

Manoeuvres for Reduction are the same as in Dorsal Dislocation.

Obturator Dislocation.—

Signs and Symptoms.—In this form of dislocation, the head of the femur lies on the obturator externus muscle, and it can be felt in the perineum. The great trochanter is less prominent than in normal condition. The limb is abducted, everted and slightly lengthened. It is flexed, and is pushed as it were forwards more than the other leg with the toes pointing outwards. There is much pain due to pressure on the obturator nerve,

If the dislocation is left unreduced, the patient may be able to walk without any appreciable pain and inconvenience except a slight stooping posture.

Treatment.—**Reduction.**—The patient lies on the floor; the procedure is similar to that described under the head of Dorsal Dislocation with a slight change of direction. The leg is lifted, the knee is flexed, and the thigh is also flexed on the abdomen in a position of abduction, and the whole limb is circumducted inwards, instead of outwards as in the case of a Dorsal Dislocation.

Pubic Dislocation.—In this, the head of the femur can be felt rolling under the finger on any movement on the horizontal ramus of the Pubis, inside the anterior inferior spine of the Ilium. The displacement causes severe pain in the anterior crural nerve due to pressure. The Ligamentum Teres and the Capsular ligament are torn, but the Ilio-femoral ligament and the Obturator Internus muscle are left untorn. The small external rotator muscles are torn. The limb is slightly shortened. Distinct abduction and eversion are present. The thigh is slightly flexed.

Treatment.—**Reduction.**—Similar to that of the Obturator Dislocation.

General After-Treatment of the Dislocation of the Hip-Joint.—

After reduction, the patient should be kept in bed, cooling lotions applied to the site of the lesion for 24 hours after the accident. Then, massage should be applied twice daily.

After a fortnight, very carefully conducted passive movements should be commenced.

Passive Movements.—The patient is lying on the bed on his back, with the hip resting almost at the margin of the bed. The masseur holds the patient's lower limb with both hands, one hand grasping the ankle, and the other carefully supporting the

knee joint. The assistant should give slight support to the affected hip of the patient with both hands. The movements should be only antero-posterior for a week. Number of movements (1 to 20).

In the second week, circumduction in and out may be tried. Number of movements (1 to 20 each) in addition to the antero-posterior movements.

Voluntary exercises should be attempted at least six weeks after the accident.

Exercises recommended.—At the beginning, the patient should start doing movements similar to those of the Hip shown before. But the patient should stand up, instead of lying down.

The patient now stands on his unaffected leg, holding some gratings of a window or some such article for support, to keep the balance.

Exercise.—(a) He now starts moving his lower limb by flexing the knee, and lifting the whole limb upwards, tries to place the thigh on his abdomen. He relaxes and drops the whole leg down. Number of movements (1 to 20).

Exercise.—(b) Now the patient straightens his leg, and moves the whole limb, circumducting in and outwards alternately. Number of movements (1 to 20 each).

These exercises (a) and (b) should be practised for about a fortnight. Then he may try the following exercises :—

Group I.—(a) Exercise No.—9.

(b) Exercise.—Assuming the position as in Figure No. 31 the patient tries to bend his hip joint backwards. Number of movements (1 to 20).

Group II.—Exercises Nos.—24, 30, 31, 30(a), 31, 31(a), 42, 42(a), 43, for a fortnight.

Group III.—Exercises Nos.—14, 15, 18, 20 in addition to Groups I and II.

DISLOCATION OF THE KNEE

Dislocation of the Patella.—It occurs in two different ways—

1. Outwards
2. Inwards.

1. Outward Dislocation of the Patella,—

Causes.—It may take place as a result of direct violence, and usually in people suffering from Genu valgum. It occurs when the leg is extended. When completely displaced, the Patella lies on the outer surface of the condyle of the femur while its inner margin is projecting forward.

Symptoms.—The knee appears to be flattened, and broader than normal. The inter-condyloid notch is distinctly seen in the normal position of the Patella.

Treatment.—Reduction by manipulation. The thigh should be flexed on the abdomen, and the knee extended. Now a little pressure applied to the outer margin of the Patella will cause it to slip back into its original position.

2. **Inward Dislocation of the Patella.**—It is a rare occurrence. If it occurs, the treatment is similar to that of the outwards dislocation.

DISLOCATION OF THE KNEE JOINT

It takes place in three different ways—

1. Forwards.
2. Backwards.
3. Lateral.

1. **Forward Dislocation of the Knee Joint.**—It is the most common form of displacement of the knee joint. The lower end of the Femur projects into the popliteal space, and presses on the popliteal vessels. Gangrene of the leg follows.

The upper end of the tibia and the patella are pushed forwards and a prominent swelling is formed with a distinct hollow above it.

The limb is usually shortened.

2. **Backward Dislocation of the Knee Joint.**—It is a rare occurrence. When occurs, the pressure on the popliteal vessels causes a similar type of gangrene as is caused by the Forward Dislocation.

3. **Lateral Dislocation of the Knee Joint.**—In this, the leg assumes a flexed condition, and is slightly rotated.

General Treatment of Dislocation of the Knee Joint.—Reduction by traction of the limb. The thigh is flexed, and the head of the tibia is pushed into its normal position.

The limb should now be fixed on a splint, and kept in that position for about 2 to 3 weeks.

After the accident, the joint should be kept soaked with cooling lotions, or ice applied for 24 hours. When 24 hours have passed, careful massage should be done twice daily, and this should be continued for about a fortnight. After the period, passive movements should be performed along with the massage for about a fortnight, before any active movement is allowed. Walking on the plane should be practised for about three weeks, then "going upstairs" may be practised along with Exercises Nos. 13 and 15.

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SUBLUXATION OF THE KNEE

(DISPLACEMENT OF A SEMI-LUNAR CARTILAGE)

It usually results from sprains and severe strains with torsion of the joint, *e. g.*, turning quickly round in games like Tennis etc., or accidentally slipping off the kerbstone with the knee in a flexed condition. There is almost always displacement of a cartilage. The internal cartilage is more frequently affected than the external. The anterior tibial band is usually torn, thereby

allowing great range of movement laterally. The marginal attachment of this anterior tibial band to the internal lateral ligament and the capsule is also torn.

Symptoms.—Immediately after the accident, severe pain is felt in the knee. The joint remains in a semi-flexed position for some hours or even for a day or two. During that time, the patient is absolutely sick with pain, and is altogether unable to extend the leg. Relief may come on suddenly with a feeling of a snap in the joint, and the power of movement of the joint suddenly returns. Synovitis usually follows this accident.

In some cases where the spontaneous return of the cartilage into its normal position does not occur, reduction by manipulation under anaesthesia is required. Chronic Synovitis sometimes follows, and the joint becomes susceptible to frequent recurrences of the trouble. The joint itself becomes very weak.

Treatment.—Reduction at an early stage by manipulation. The limb is fully flexed, and then quickly extended. During this manoeuvre, pressure should be applied right round the displaced cartilage which returns with a snap into its usual position. The limb is then put on a back splint, kept at rest, and cooling lotion or an ice pack applied for at least 24 hours. As soon as the acute inflammation subsides, the joint should be placed in a Plaster of Paris casing for at least 6 weeks. After this period, the plaster should be removed, but the limb should be massaged twice daily (for about 15 to 30 minutes every time) and put up on the back splint again, for about a week. Then massage and passive movements should be resorted to for about a fortnight.

After about 10 weeks from the date of the accident, the patient can go in for voluntary exercises with an elastic knee-cap applied.

Walking should be encouraged with the help of crutches for about a week, and then the patient may go about without any aid, and may attempt the following exercises :—

Group I.—Exercises Nos. 13, 51, followed by slow walking.
After a fortnight, Group II may be attempted.

Group II.—Exercises Nos. 15 and 15(a) followed by fast walking. Massage should be encouraged after the exercises.

If the cartilage becomes permanently loose, and frequently slips out, surgical operation is imperative ; and after the wound is healed, massage and passive movements should be tried as advised before, for about 3 weeks. Then the patient can be allowed to walk about, and perform the voluntary exercises as mentioned before.

DISLOCATION OF THE ANKLE JOINT

It may occur in different directions as following :—

1. Lateral (inwards or outwards).
2. Upwards.
3. Backwards.
4. Forwards.

1. Lateral Dislocation of the Ankle Joint.—

This practically consists of fracture-dislocation, usually taking place when the patient slips on the inside or outside of his foot. Fracture-dislocation of both tibia and fibula, also fibula alone may be caused as the result of this sort of displacement.

Treatment.—As mentioned under the heading of "Pott's Fracture", Chapter XII.

2. Upward Dislocation of the Ankle Joint.—

This is very rare. In this, the astragalus is pushed upwards, together with the foot between the tibia and fibula.

Symptoms.—The inferior tibio-fibular ligament and the lower end of the interosseous ligaments are torn.

3. Backward Dislocation of the Ankle Joint.—

It may occur when the patient falls on his feet as in running or jumping. In this, both the internal and external malleoli are fractured. The heel projects unduly backwards and the lower end of the tibia, rests on the neck of the astragalus or the scaphoid.

4. Forward Dislocation of the Ankle Joint.—

It is a rare occurrence.

Symptoms.—The lower end of the tibia is pushed on the posterior part of the upper surface of the os-calcis, and the foot is lengthened.

Treatment of Forward and Backward Dislocations of the Ankle Joint.—

Reduction by Traction. The foot is kept carefully at right angles to the leg; the articular surfaces of the tibia and the astragalus being placed exactly in apposition. The leg is then put on a pair of "Cline's" side splints. The leg is kept on the splint for about 3 weeks. After that period, the superficial bandages should be opened every alternate day, and massage given for 15 minutes once daily. After massaging for three weeks, the splint should be removed temporarily every day, and passive movements, also massage may be given. The leg should be put on the splint again after such procedure. After about 2 months from the date of the accident, voluntary movements like the following exercises may be attempted :—

Exercises Nos.—52, 52(a) followed by massage to be continued for about a fortnight, and then walking with the help of crutches should be encouraged. Massage should be applied every time after the exercise.

CHAPTER XIV

DEFORMITIES

TORTICOLLIS (Wry-Neck)

This deformity is characterised by the affected side of the head being drawn towards the shoulder, and the face is turned towards the normal side. The face is slightly less developed on the side affected.

Varieties :—

1. Intra-uterine.
2. Congenital.
3. Muscular.
4. Nervous.
5. Hysterical.

1. **Intra-uterine Torticollis.**—It is due to some faulty position of the foetus when in the mother's womb.

2. **Congenital Torticollis.**—Due to some laceration of the Sterno-mastoid muscle during the birth of the child.

3. **Muscular Torticollis.**—It is caused by cicatricial shortening of the Sterno-mastoid muscle after the healing of some Intra-muscular abscess or gumma.

4. **Temporary Torticollis (Rheumatic Myositis)** is often met with in patients exposed to cold.

5. **Nervous Torticollis.**—Spasmodic Torticollis may result from :—

(a) Direct irritation of the nerve trunk or its routes, due to inflammation of the cervical spine or inflamed cervical glands.

(b) Reflex irritation caused by some carious teeth.

(c) Irritation of the Cortical centres.

6. **Hysterical Torticollis.**—Hysteria is sometimes responsible for the causation of Torticollis.

Morbid Anatomy.—The Sterno-mastoid and the adjacent group of muscles of the neck working on the same side get contracted, and ultimately shortened; while the clavicular portion of the muscle may be quite relaxed. Their antagonistic muscles on the other side of the neck are stretched.

In Congenital Torticollis and in cases of cicatricial contraction of the muscles, the Sterno-mastoid muscle of the affected side stands out as a cord due to excessive growth of fibrous tissue in place of the muscle substance. The deep cervical fascia gets secondarily contracted. Similar changes take place in the ligaments. Changes in the form of the cervical vertebrae take place, and the bodies of the vertebrae become wedge-shaped, having the base facing the unaffected side.

Treatment.—The treatment should be according to the cause of the trouble. If it is due to—

(a) **Local inflammation of the cervical glands.**—The treatment will be fomentation and application of Anti-flogestine.

(b) **Irritation of the nerve trunks.**—Anti-neurotic treatment.

(c) **Rheumatic affection.**—Anti-rheumatic treatment.

(d) **Syphilis.**—Anti-Syphilitic treatment is required.

If it be due to Congenital or Tonic contraction of the muscle or its tendon—Massage and passive movements or use of some mechanical apparatus are required.

Operative treatment of the Sterno-mastoid muscle is also in vogue.

Exercises.—1. Use of the Head suspension apparatus will cause stretching of the Sterno-mastoid muscle, and this could be tried after a certain number of passive movements.

2. Passive movements or flexion of the side opposite to the affected side following the movement of Exercise No. 38.

Once the flexion only, and again the flexion and rotation combined. The movements should be alternately right and left.

3. After the passive movements for some time, active contractions should be attempted on the sound side with passive movements of the affected side.

DEFORMITIES OF THE SPINE

SCOLIOSIS

It is a term used to mean a lateral curvature of the spine with simultaneous rotation of the vertebrae in such a way as the anterior surface of the body of the affected vertebrae are turned towards the same side of the curve.

Causes.—1. It may start in Rickety subjects, and these Rickety children have their bones softened due to deficiency of calcium salt in them. These subjects are not able to support the weight of the body properly, so irregularity of developments is manifested; and as a result, the spinal column becomes contorted in an unnatural form.

2. Congenital Scoliosis is usually found between the lumbar vertebrae and the sacrum.

3. Hereditary predisposition may be a factor in the formation of Scoliosis.

4. Sex is another factor in the production of Scoliosis. Girls develop this affection more than boys, as the girls like to remain in one quiet posture for a long time while the boys are naturally more active and are disposed to fight with one another during their leisure hours.

5. It results from some inflammatory conditions of the lung and the chest wall. Fibrosis of the Lungs due to chronic Pneumonia or Empyema causing marked sinking in of one side of the chest, develops the curvature having its convexity towards the healthy side. Adhesions caused after the healing of Pleuritic affection of the visceral and the parietal pleurae also help the development of Scoliosis in some cases.

6. Asymetry of the body such as :—

- (a) Congenital shortness of one leg—if the cause be some defect in one of the legs, the pelvis is tilted down on the same side with the shorter limb, and a lumbar curvature is produced, having the convexity towards the side of the shortened leg, while compensatory dorsal curve in the opposite direction is subsequently adopted so as to maintain the position of the body in the general axis.
- (b) Unilateral dislocation of the Hip.
- (c) Contraction of the knee or the hip joint.
- (d) Talipes foot (genu valgum).
- (e) Sometimes a very long standing Torticollis in which the cervical curve is primary, and a compensatory curve is formed in the dorsal region of the opposite side.
- (f) One-sided Infantile Paralysis (Hemiplegia).—On the healthy side, there is a tendency of checking the motion during movement, so there may be a curve in the spine having the convexity towards the healthy side ; and as it is due to Paralysis, there is a retardation in the growth of the skeleton on the affected side, consequently the convexity is distinctly marked. Certain amount of convexity is manifested in the paralysed side, but this is only compensatory.
- (g) Postural Scoliosis due to some habitually faulty position. This usually causes the lateral curvature. Postural Scoliosis generally develops during puberty and school life, when the general growth of the body is very rapid. Any habitually defective position during this period of life, affects the normal growth and contour of the skeletal frame.

Symptoms.—It always varies according to the extent and type of the deformity. Sometimes, there is only one curve in the whole of the spinal column called Total Scoliosis. But generally there are two curves present—(1) the primary and (2) the secondary or compensatory. There is occasionally certain amount of kyphosis associated with this. The type of Scoliosis most commonly met with, is of a double curvature as will be seen in Fig. A. having the convexity of the dorsal spine on the right and a similar convexity of the lumbar spine on the left.



Fig. A.—A double curvature of the spine as it is seen from behind.

The upper three or four dorsal vertebrae form a part of the curve in the cervical region. So the sites of the angles of the upper ribs situated on the convex side of the curvature seem to be slightly swollen, and the angles of those ribs project slightly backwards. The upper part of the Scapula also projects backwards, and it is higher than the Scapula on the concave side of the curvature.

Curvature in the dorsal region of the spine—On the convex side of the curvature, the sites of the angles of the ribs look swollen

as the ribs project backwards ; while the site of the angles of the ribs on the concave side as will be seen in Fig B., looks distinctly flattened.

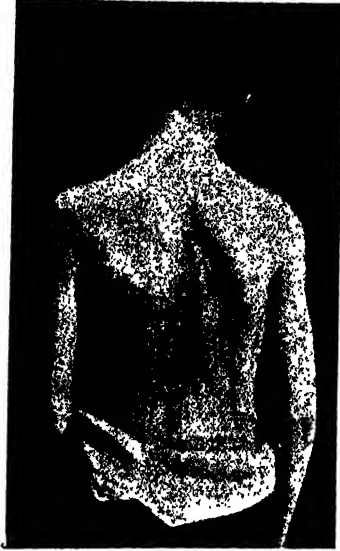


Fig. B.—The site of the angles of the ribs on the concave side looks distinctly flattened.

The shoulder and the scapula on the convex side of the curvature look higher than that of the concave side. The outer angle of the scapula sinks forward so that the scapula itself is pushed slightly away from the middle line. The lower angle projects backwards, and is at a higher level than on the concave side. On the concave side, the site of the curvature of the angles of the ribs looks flattened. So the Scapula of that side lies close to the chest wall, and nearer to the middle line. Again being more anteriorly placed with the lower angle, and rotated inwards, the scapula as a whole and the shoulder itself on the concave side lie at a lower level than at the convex side of the curvature.

The back on the convex side of the curvature looks broader than that of the concave side.

A compensatory curve is usually developed in the lumbar region. But as soon as the compensatory change starts, the difference of the height between the scapulae becomes less.

In addition to the lateral displacement, there is usually found a rotation of the body of the vertebrae towards the convexity of the curves. This is purely mechanical, and is due to the interlocking of the posterior parts of the vertebrae and a stronger support given to them. The spinous processes are pointed towards the concavity. At the junction of the two curves, there may be some backward projection of the spine as well changes of form in the chest wall. The back of the chest wall and the scapulae get deformed as pointed out above. The front wall of the chest of the convex side is flattened, and consequently, the opposite side looks bulging, and the thorax becomes more or less rhomboidal in shape. The Sternum is slightly displaced, and twisted towards the concave side. The capacity of the thorax is not affected in the early stage of the trouble, but later on, it is markedly diminished, causing displacement of the abdominal viscera. Due to extreme twisting of the Sternum, the Sternal end of the clavicle may be spontaneously dislocated.

Morbid Changes.—At first, no change in the structure of the vertebra is manifested. But as the trouble becomes chronic, the individual vertebra becomes distorted. The bodies of the vertebrae on section are found to be somewhat wedge-shaped, being thicker on the convex than on the concave side. The inter-vertebral cartilages undergo a similar change. The articular processes are too much pressed together on the concave side, and separated from one another on the convex side. The spinous and the transverse processes are curved, and approximated to one another on the concave side. The muscles in the early stages of the deformity, are found to be relaxed on the concave side, but later on, get contracted and stretched on the convex side. The ligaments at first remain relaxed on the concave side, but later on get shortened, and gradually disappear. The bodies of the vertebrae become ankylosed.

Prognosis.—The prognosis depends on the condition of the different stages of the trouble that it has reached. If it be of the first degree, *i.e.*, if the curve can be made to disappear on extension of the spine; the trouble can be completely cured by proper treatment. If it be of the second degree, *i.e.*, if the curve be partly flexible, the trouble can be partly remedied by extension exercises. But if it be of the third degree, *i.e.*, if there be no appreciable flexibility, there is very little chance of improvement. But in these cases, all that can be done is to prevent its getting worse. The younger the patient, the better is the chance of improvement, as all the Epiphyses and Diaphyses of the long bones do not get united, and the general growth of bones is not stopped before his twentieth year. So the chance of improvement and cure is practically limited up to that age.

Treatment.—The treatment of Scoliosis may be divided into three different processes.

1. Prevention.
2. Maintenance of equilibrium of the body by changing the position of the Pelvis.
3. Correction by exercises.

1. **Prevention.**—The causes of the trouble should first be detected, and steps should be taken to remove them as early as possible, so that the trouble can be checked, and cured in the incipient stage, and remedied at any rate, if it be chronic or a long standing one. Before the deformity has set in, and when the trouble disappears on extension of the spine, there is every chance of the trouble being cured if properly treated.

In cases which occur in young children due to constitutional and local weakness, the patient should be sent to some seaside resort. Tonics such as Iron and Arsenic should be administered, also well regulated, physical exercises recommended especially to improve the muscles of the back.

The young patient when at school should be put under careful observation, and his or her position when receiving lessons should

be carefully noted. Suitable seats and desks should be provided, with corrections if necessary.

One-sided occupation such as Violin or Piano-playing which usually leads to Scoliosis, should be very strictly avoided.

2. Maintenance of Equilibrium of the body by altering the position of the Pelvis.—If there be inequality of the lower limbs, the short leg can be dressed with a cork sole or raised heel (shoe or boot).

By using a wedge-shaped cushion when sitting, with the thicker end of the wedge placed under the side having convexity of the spine, the position of the Pelvis may be altered, and thereby the Scoliosis can be corrected.

3. Correction by Exercise (Physical).—The main principle in the treatment of Scoliosis by Physical Exercise is to pay particular attention to the regularity and the amount of exercise taken, so that the tone in the muscles of the whole body as well as those under training, especially those of the back will improve. Fatigue should be strictly avoided as that will make the case worse.

The following set of Exercises may be practised for a month :—

Group I.—(a) The patient should be asked to rest in Supine position on an inclined back-rest (properly adjustable) of a chair for half an hour.

(b) Then he should try to get on a Horizontal Bar, and do some swinging movements.

(c) If the arm be powerful enough, tie some weight to the legs, and go on with the Horizontal Bar exercises as mentioned above.

(d) Then Exercises Nos. 9 and 5 should be tried.

Group II.—In addition to the above exercises, the patient should regularly receive some stretching movements; and special manipulations should

be applied on him by the Physical Instructor.
The procedure should be as follows ;—

The Physical Instructor should help the patient in performing the exercises Nos. 17, 18 and 20 (The bending and twisting movements should be performed only towards the convex side of the chest), with application of a certain amount of pressure towards the side of the patient he is bending. These exercises should be continued until some marked improvement is manifested.

Before attempting the above-mentioned exercises, the Physical Instructor should apply stretching movements on the patient as described below :—

Position.—The patient is sitting on a stool of moderate height, and the Physical Instructor stands behind, a little to the

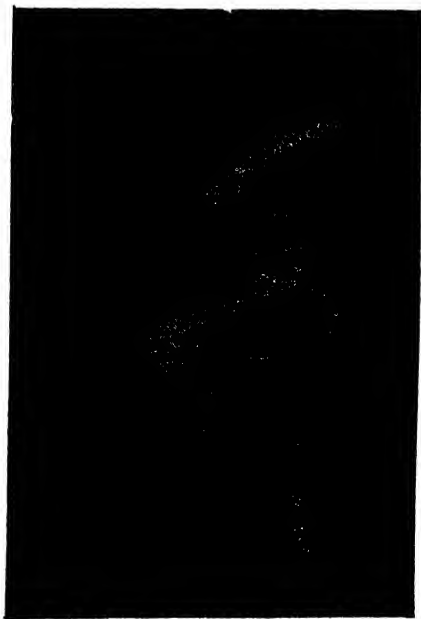


Fig. C.—The Physical Instructor grips both the shoulders of the patient with both hands, and places his left knee pressing against the convexity on the right chest.

right side of the patient (in case the patient has the convexity of the chest on the right side) as shown in Fig. C. He grips

both the shoulders of the patient with both hands, and places his left knee pressing against the convexity on the right chest,

Manipulations.—The Physical Instructor now pulls the patient by the shoulders and pushes him with his left knee already placed against the convexity of the chest. The pull and the push should be simultaneously, slowly and steadily applied. The pressure should last for about ten seconds at every attempt. The number of attempts should be (5 to 20) and the range of movements should be as far as the body can be bent sideways (with a twist backwards) without causing pain to the patient.—The range of movement should be increased everyday.

Massage.—The chest and the back should be massaged shortly after the performance of these stretching movements for 5 to 30 minutes. (Refer to Introduction pages XIX—XXII).

Group III.—Exercises Nos. 17, 18, 20 with a very small weight 2 to 5 lbs. (a dumb bell) on the hand of the side having the convexity of the spine, while the other hand holding a pretty heavy weight 5 to 10 lbs. or more.

Exercises Nos.—25 and 19 should follow the above-mentioned exercises.

Group IV.—After some appreciable improvement derived from Exercises under Groups I, II, and III, the patient may try Exercises Nos. 14 and 15, and continue Exercises as mentioned under Groups I and III.

KYPHOSIS (Hunch Back)

In this form of deformity, the whole spine forms an angular arch behind.

Causes.—(1) **Growth.**—Defective growth in children, due to Rickets.

(2) **Faulty Clothes.**—The clothes being too short or tight fitting in front.

(3) **Habit.**—Defective habit in boys and girls especially those suffering from Myopia, continuous stooping during reading or writing.

(4) **Occupation.**—Carrying of heavy weights by porters, continuous stooping posture and overwork of cobblers etc., lead to a kyphotic appearance in adult age.

(5) **Age.**—Old age due to senile atrophy.

(6) **Diseases.**—(a) Usually general diseases of the spine in Osteitis Deformans, Osteo-Arthritis, Osteo-Malacia and Hypertrophic Osteo-Arthritis cause Kyphosis.

(b) Tuberculosis, Gumma or Cancer of the Spine.

Symptoms.—The chief symptom is deformity with an increased convexity of the dorsal region of the spine in the back, associated with loss of lumbar concavity. As a result, the whole spine is arched with convexity backwards.

Due to the sharpness of the angular curve, there is pressure on the spinal cord, causing some disturbance of circulation which results in defective nutrition and inadequate performance of functions of the spinal cord. The following symptoms of compression Myelitis may be manifested in the lower extremities.

Affecting the motor nerves :—

(a) Cramps due to irritation.

(b) Weakness or complete Paralysis.

Affecting the sensory nerves.—

Pain, numbness or tingling sensation due to—Irritation.

Loss of sensation due to—Paralysis.

There may be increase in reflexes.

Due to the consequent deformity of the chest, there is obstruction to the work of the heart and lungs. As the subject always tries to maintain an upright position, the back muscles are all put to continual overstrain which causes some inflammation of the muscles.

Treatment.—In the majority of cases, active movement is dangerous and impossible. But as soon as the presence of the disease is suspected without any permanent deformity, except the following premonitory symptoms—(stiffness or pain in the back after standing or walking for a long time, tenderness on the spinous processes on pressure, and no relief attained after massage)—the following treatment may be adopted :—

1. The general health of the patient should be attended to.
2. The position of the patient during his school or working hours, should be corrected.
3. Faulty cut of the clothes of the patient such as too narrow or too short, also fitting too closely in front, should be corrected.
4. The patient should be advised to keep his head erect as much as he can during sitting or walking.
5. Physical exercises suitable for correction of Kyphosis should be resorted to.

The following procedure is recommended :—

- (a) The patient should lie on his back on a table with a comfortable pad being placed behind, and held in that position by a masseur for about half an hour every day. The masseur stands at the head of the bed, presses the shoulders of the patient by placing

his right hand on the right shoulder, and the left hand on the left shoulder respectively. The pressure should be applied gradually, so that the full body weight of the masseur should not fall on the patient's shoulder when starting with the process.

- (b) The patient should try the next procedure.—Hanging against a steep slope with a cushion placed behind his back as shown in Fig.—D for a period, till his grips get tired. He should gradually increase the duration of this hanging process.

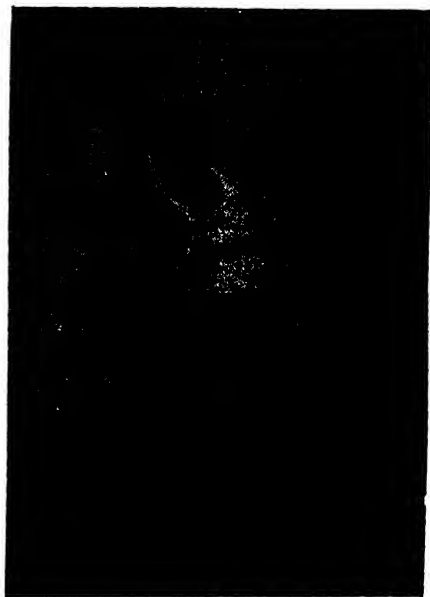


Fig. D.—The patient is hanging with a cushion placed behind his back.

- (c) Then the patient should try to get on a horizontal bar and make some swinging movements.
- (d) He would then get down, sit on a chair, leaning on the back rest (which makes an angle of 140 degrees with the seat in front). The masseur should put a pad behind the back of the patient, press on his shoulders slowly and steadily for about 1 minute.

He should relax the pressure for half a minute, and repeat the process for about 10 minutes. As days pass on, the back rest of the chair should be gradually changed into one big plane of 180 degrees, and the patient should lie on it with a comfortable pad behind.

After this process, the patient should sit on a stool, and the masseur should apply systematic massage on the back with steady pressure on the spine from above downward, and with a few lateral twists (right and left) for 15 to 30 minutes daily.

The following active exercises should be added to the programme.—

Exercises Nos.—5, 44, 9, 32, 22, 34, 14.

After practising the above set of exercises for about a fortnight, the patient should make a change in Exercise No. 9 mentioned above; and instead of using free hand when performing the exercise, he should use a Bar-Bell (very light to start with, say 2 lbs.), gradually increasing the weight up to 20 lbs. After assuming position as shown in Fig. 20, the trunk should be bent, making a slight curve with concavity behind. The curve should be gradually increased as much as possible, without losing the balance.

ROUND SHOULDER

Causes.—This deformity is found very frequently in girls who have grown rapidly. Sentiment and precocity during early adolescence are greatly responsible for the development of this defect. Usually a round shoulder is due to defective standing or sitting in schools. In boys and young men, faulty desks or chairs, occupations in a stooping posture or manual labour in which the boys are mostly kept in a forward leaning position, and the muscles of the chest are mostly used, cause round shoulder. Myopia or Adenoids are some of the intrinsic conditions which are responsible for causing round shoulder. Faulty cut of the clothes, (too short or too narrow in front, and fitting too tightly) may also be one of the causes.

Symptoms.—There is an increase in the extent of the normal curve having the convexity backwards in the dorsal region of the spine. Kyphosis is often combined with round shoulders. Shoulders on either side of the back are rounded, and they are carried forwards. The chest is contracted.

Morbid Anatomy.—In round shoulders, the shoulder muscles and the muscles of the back of the chest become lengthened. The muscles of the chest, especially the Pectoralis muscles get shortened. In cases of long standing, the Sterno-mastoid muscles become shortened and the clavicles become prominent.

Treatment.—The first aim should be to find out the cause. Chairs, stools or desks should be changed according to the suitability of the patient. The child should be watched, and advised to sit in a correct position during his school hours. The general health should be attended to, open air sports encouraged, and tonics prescribed. Attention should be paid to the muscles of the back, specially the Erector Spinae, Trapezius, Rhomboidus major and minor, also the Serrati, in order to increase their strength. Passive movements by extension should be employed for the thorough relaxation of the pectoral muscles. Massage and extension of the back are imperative. The patient should be advised not to cause overstrain in any exercise or occupation. He should rest on his back for half an hour, three or four times daily. At night, he should lie on his back without a pillow under the head, but with a pillow beneath the curvature of the spine.

Exercises recommended.—

Group I.—Chest Expansion.

Group II.—Exercises Nos. 14, 5, 9, 18, 19, 20, 39, 40.

Passive extension of the back and relaxation of the pectoral muscles could be effected by making the patient lie on his back on a narrow bench with a pillow under the curve, the head hanging beyond one end of the bench, and the arms stretched at right angles to the middle line of the body. Now the masseur or the Physical Instructor will press both the arms downwards, holding them

just above the elbows. The pressure should be slow and continuous for a few minutes. The best way to give the extension is to put some weight (5 to 10 lbs.) hanging with a string and tied to the patient's arms just above the elbows on either side, with a strap, and allow the patient to lie in the aforesaid manner on the bench, for half an hour at a time, twice daily, once in the morning and once in the evening. Massage should be applied for at least fifteen minutes, just after the extension procedure.

LORDOSIS

Lordosis means an increased anterior curvature of the spine in the lumbar region. It is found as a temporary condition in women during pregnancy, and is a permanent symptom in bad types of uterine fibroids, also in fat men with large, fat and pendulous abdomen.

Morbid Anatomy.—The abdominal muscles and the ligaments situated in front of the lumbar vertebrae are lengthened, while the ligaments and muscles situated behind those vertebrae get shortened. If the forward inclination of the pelvis is increased, the hamstring muscles, semi-membranosus, semi-tendinosus and the biceps thigh are lengthened, and the flexors of the hip get shortened. But if the inclination be diminished, the hamstrings get shortened.

Causes.—1. Habitual wearing of high heeled shoes or boots.

2. Continued flexion of the hip either due to congenital displacement, unreduced dislocation or hip disease.

3. Weakness of the abdominal muscles.

4. Large, fatty and pendulous abdomen.

5. Sometimes, progressive muscular atrophy or pseudo-hypertrophic muscular palsy, in which the centre of gravity of the body is displaced forwards, causes Lordosis to maintain equilibrium during walking.

Treatment.—Wearing of high heeled boots or shoes should be avoided.

Any dislocation of the hip joint present, should be corrected by reduction and surgical interference if required.

Large pendulous abdomen and weakness of the abdominal muscles should be corrected by regular and systematic exercises (Abdominal), and abdominal massage. To attain this end, the following exercises should be attempted :—

Exercises Nos.—9, 10, 10(a), 17, 18, 19, 20, 22, 23, 26 and later on—

Exercises Nos.—27 and 28 and all the exercises together.

To give tone to, and improve the power of contraction of the hamstrings, semi-membranosus, semi-tendinosus and the biceps femoris :—

Exercises Nos. 13, 15, 16 should be attempted.

CONGENITAL CONTRACTION OF THE FINGERS

It is usually limited to the little finger.

Causes.—Contraction of the central prolongation of the palmer fascia in the finger.

Treatment.—Application of a splint, and regular massage. But in severe cases, surgical interference with division of the bands in the palmer fascia may be necessary. Massage, passive exercises and later on, active exercises such as Exercise. No.—11 and 12 plus extension of the hand (backwards also sideways) should be practised.

COXA VARA

It is a deformity of the hip joint. The neck of the femur which in the normal subject passes obliquely upwards, becomes horizontal with the shaft in Coxa Vara. It may be unilateral or bilateral.

Causes.—1. Softening of the bony tissue starts first, and then sclerosis follows.

2. In the unilateral deformity, injury, like separation of the Epiphysis may cause this trouble.

3. Rickets in young children.
4. Late Rickets may be the cause in adolescence.
5. Osteo-Arthritis.

6. In old age, the neck of the femur becomes the seat of atrophy, naturally the angle between the shaft and the neck increases.

Symptoms.—1. The trouble commences with distinct pain in the hip and a limping gait in the patient.

2. The leg gets shortened even by one and a half inches. The Trochanter when measured, is found to be above Nelaton's line (the line drawn from the anterior superior spine of the Ilium to the most prominent part of the tuber ischii. The centre of this line corresponds to the top of the great trochanter, if the limb is placed in the axis of the body) and is increasingly prominent especially on flexing the thighs. The limb is everted.

3. There is marked adduction which is found during flexion of the limb. Abduction is practically impossible in severe cases, when the base of the trochanter strikes against the rim of the Acetabulum.

4. There is scissor legged deformity when both sides are affected.

5. Sclerosis is present in case of an unilateral deformity.

6. Flexion and extension of the leg are free, and there is no pain.

Treatment.—In the early stages when the deformity is increasing, rest should be resorted to; walking and exercise will increase the deformity.

Prolonged extension with abduction of the leg should be applied to draw the femur downwards.

Surgical operation as Osteotomy of the neck of the femur is often performed below the trochanter, and subsequent shortening of the leg is managed with a thick sole on the under surface of the boot.

Proper massage and passive movements are required to improve the blood supply and nutrition of the bone.

All these passive exercises should be performed when the patient is in a lying position.

GENU VALGUM (Knock Knee)

Symptoms.—It is a deformity of the lower extremity. In this, if the patient is asked to stand with the knees in close contact, both the patellae will touch each other, and the inner maleolli will be separated widely from one another. In a well marked case, the patient is seen walking with a characteristic rolling or waddling gait.

Causes.—During childhood, Rickets may be considered to be the only cause.

During adolescence, it is due to want of proper nourishment, carrying heavy weight, also much walking. Anaemic young girls who work as nurse maids, also young bricklayers and porters usually suffer from this trouble more or less. Genu Valgum is found occasionally in some long-legged cavalry soldiers, and short legged jockeys. Trauma such as fracture of the tibia or femur close to the knee joint, or lateral dislocation of the knee joint may also cause Genu Valgum.

Anatomical changes.—*In children*—who have developed Genu Valgum mostly from Rickets, a localised bony outgrowth can be detected on the inner surface of the tibia about 2 or 3 inches from the knee joint. In such cases, there is caused a sort of localised periostitis at the point of attachment of the internal lateral ligament. *In adolescence*—the changes are manifested in three stages :—

1st Stage.—The ligament (internal lateral), and the muscles and fascia on the inner side of the knee joint become relaxed.

2nd Stage.—The Ilio-tibial band, the external lateral ligament, the fascia lata and the tendon

of the biceps muscle get contracted and shortened.

3rd Stage.—There is prominence of the internal condyle of the femur and the internal tuberosity of the tibia. The patella is gradually thrown outwards from the angular deformity already existing in the knee joint. The bone sometimes gets dislocated, and recurrence of this dislocation is very common.

Treatment.—In young rickety patients, improvement of the general constitution should be the first principle of treatment. Plenty of healthy cow's milk, fruit juices, and raw-meat juice should be given. The bowels should be kept clear, and healthy surroundings should be resorted to. Regarding medicine—Syrup Feri. Phosph. Compound may be administered with advantage. Cod Liver oil will do a lot of good to thin subjects.

Static Treatment.—The child should be allowed to assume recumbent posture, it should not be permitted to crawl or run about. Movements of the legs should be permitted without weight-bearing. The best procedure is to advise absolute rest in bed. The limb and joint should be massaged daily for at least half an hour. Passive movements should be given, and pressure applied to straighten the limb.

In older children, splints in the form of a strong iron stem may be applied on the outer side of the limb, reaching from the pelvis down to the outer side of the ankle, with well padded bandages fixed at different levels; a broad one especially suited to enclose the knee joint, and firm enough to draw the knee outwards while the bandage is gradually tightened.

Massage should be applied after removing the splint for about an hour, twice daily. The muscles on the outer side of the limb should be given stretching (passive) movements, while those on the inner side should have exercises (resistance) followed by massage. The limb should then be put on the splint again.

Where there is marked bony deformity, and the patient is too old for such treatment, surgical interference is necessary. Several methods of operative treatment are in vogue.

The following are the special exercises recommended :—

Group I.—(a) *Position*.—The patient should lie on his back on the floor with the legs fully extended, a pad (2 to 3 inches thick) placed in between the knee joints, and the feet tied close with a strap (fixed with a buckle), and then the following exercises should be practised :—

Exercises Nos. 42(a), 29, 31(a), and then Exercise No. 66 should be attempted.

(b) After these exercises, the masseur will remove the strap and the pad. He will give passive movements, stretching the muscles of the outer side of the leg, and massage the limb for (15 to 30 minutes), and re-adjust the splints.

After some appreciable improvement, attempt —

Group II.—(a) Try Exercise No. 43, pull the legs close together (straight and fully extended and the feet kept inverted).

(b) Exercise No. 13 with the toes pointed inwards.

(c) Exercise No. 15.

(d) Exercise No. 16 with the toes close to each other and pointed inwards.

GENU VERUM

(Bow Leg)

In Genu Verum, the curvature is manifested in the thigh bones and in the legs, having the concavity inwards and the convexity outwards. It is commonly found in veteran horsemen accustomed to riding from a very young age.

Treatment.—Usually, treatment is not required, except in very bad cases.

Preventive Treatment.—Removal of the cause is the best treatment.

Young youths especially undergoing training for heavy-weight lifting under 16 years of age, should not be allowed to lift too heavy weights which cause the soft bones of the leg and the thigh to bend.

SPURIOUS VALGUS

(Flat Foot)

Causes.—This deformity is commonly met with in Nurse girls and Shop boys who are of poor physique, and who shortly after leaving schools, adopt occupations exposing themselves to long standing, over fatigue and involving the lifting of comparatively heavy weights ; also in people used to prolonged walking. Thus the excessive body weight bearing on the weak arch of the foot, destroys the normal arch, causing the whole foot flat and everted.

Rickets developing during the first year of life or at puberty, helps the development of this trouble.

Fracture of the neck of the Astragalus and the greater or the lesser process of the Calcaneum, may give rise to flat foot.

Rheumatism may in some cases cause flat foot.

Gonorrhoeal inflammation of the Anterior Calcaneo-Scaphoid Ligament is another determining factor. The inflammation causes the ligament to become relaxed, and it yields under the weight of the body.

Symptoms.—The first symptom that is manifested in the beginning, is pain in the foot, often extending upwards towards

the leg. This pain is increased by too much walking and standing for a prolonged period, and is usually aggravated at night. Later on, the gait becomes shuffling. The arch of the foot is almost invisible, the foot looks flattened instead. In distinct cases, the sole of the foot comes in contact with the ground throughout its whole length. The inner border becomes convex and somewhat lengthened, the anterior portion is slightly everted, the outer border is slightly raised from the ground. The head of the Astragalus is distinctly felt a little below and in front of the Internal malleolus. The Sustentaculum Tali (the lesser process of the Calcaneum) which is normally found to be about three-fourth of an inch below the malleolus, becomes invisible by this displacement.

Treatment.—In the beginning of the trouble, when the deformity is not very prominent, rest is essentially necessary. The foot should be given proper massage with stimulating embrocations. The general constitution should be improved by Tonics and healthy surroundings. Excessive body-weight should be got rid of. Square-toed boots should be used to avoid the development of valgoid position of the foot. The patient should be advised to walk with the toes pointed forwards or even inwards with the boots having the inner side of the heel slightly thickened. He may also be advised to sit cross-kneed as a tailor, and this will exercise certain amount of constant pressure inwards upon the front of the foot. An instep pad may be used to support the foot while walking. This pad should fit the foot exactly from the root of the toes to the heel.

In severe cases, the patient should be advised to keep the foot at rest for two or three weeks, in a corrected position, and fixed in a Plaster of Paris casing.

In advanced cases, operative methods may be resorted to ; but they are not very satisfactory.

Exercises recommended.—

Group I.—Exercise No. 15 with the feet flat when standing up, and standing on the toe of the foot when making the deep knee bend.

Exercises Nos. 16 and 16(a).

Group II.—Exercises Nos.—52, 52(a).

Group III.—Try to walk on your toes for a short distance with the toes slightly pointing inwards in addition to the exercises in Groups I and II.

For general physical improvement the following exercises are recommended :—

Exercises Nos. 1, 2, 3, 4, 5, 44, 9, 13, 14, 18 and 20.

PES CAVAS
(Claw Foot)

In this deformity, there is an exaggerated concavity in the arch of the foot. When the patient stands, there are only two segmental (Anterior & posterior) impressions marked on the ground with a complete break of continuity of the impressions. The anterior segment of the impressions is caused by the head of the metatarsal bones and the tips of the toes, while the posterior one is caused by the heel.

Causes.—1. It is sometimes hereditary.

2. It is almost always an acquired deformity, caused by habitual wearing of high-heeled shoes or boots.

3. Some nervous diseases causing atrophy of the Peronei muscles, may give rise to this trouble where the weight of the body is transmitted through the toes. Due to the weakness of the Peronei, the short flexor muscles of the leg are free to act, and by their contraction, draw the heel downwards in order to reach the ground, and so the arch is increased.

Morbid Anatomy.—The tendo-achilis is shortened. The planter fascia is contracted. The toes are hyper-extended at the metatarso-phalangeal joints, and get flexed at the inter-phalangeal joints. Due to constant over-pressure, the dorsum of the toes also the skin beneath the head of the metatarsals get roughened, and so callus develops.

Treatment.—During early stages, stretching and massage of the contracted foot, also of the weakened muscles of the leg are of great advantage. Along with this procedure, application of suitable splint to the sole of the foot with moderately strong bandage will be of much value. In very much advanced cases, operative treatment may be resorted to, and that should be followed by proper massage and passive stretchings.

Regular use of very low-heeled shoes or sandals tightly strapped, does a lot of good.

Exercises recommended.—

Group I.—To start with, Exercise No. 52 should be tried as a passive movement which should be helped by the masseur, who will apply force gradually so as to cause a maximum extension of the ankle joint. The number of movements should be (3 to 50)

The exercise should be followed by massage.

After following this process for about a fortnight, the patient should attempt extension of the ankle voluntarily, also with the help of the masseur. Number of movements (3 to 50).

Group II.—The patient should put on a sandal, having the straps crossing the dorsum of the foot and holding it pretty tightly. Now he should attempt Exercise No. 14 with the sole of the foot touching the ground completely. The heel should never be allowed to rise from the ground during the exercise.

Group III.—With the sandals on as in the previous exercises, the patient should now attempt Exercise, No. 15. Number of movements (3 to 50).

Group IV.—Attempt Exercise No. 52(b). Number of movements (3 to 50).

Group V.—Practise fast walking with the sandals on.

TALIPES
(Club Foot)

Talipes means a deformity of the foot, due to defective development of the muscles, bones and ligaments of the leg and the foot. The relative position of the Tarsal bones to the bones of the leg and to each other is altered, and the bones are held in their peculiarly altered position, by contraction of those imperfectly

developed muscles, bones and ligaments causing even alterations in the shape of the bones.

Causes.—1. Congenital.

2. Acquired.

Congenital causes.—It is usually hereditary. It may occur in many members of the same family, or may be transmitted to generations. It may be due to mal-formation (usually the result of imperfect development of the bones) of the foot or the leg, due to mal-position of the foot when in the uterus of the mother. Insufficiency of liquor Amnii causes the foot of the foetus to be abnormally pressed, and held in one position.

Acquired causes.—

1. Derangement of equilibrium, due to paralysis of central origin. The equilibrium that is naturally maintained between the antagonistic muscles of the foot is lost. As a result, the most powerful groups of muscles draw the foot into an unnatural position.
2. Contraction of muscles as an after-effect of diffused suppuration resulting from burns or diseases of the neighbouring bones.
3. Chronic Myositis Fibrosa, leading to muscular shrinking.
4. Involvement of the main peripheral nerve trunks of the leg.
5. Compensatory Talipes Equinus may be produced by shortening of the leg, due to hip or knee injury.

There are four different types of Talipes :—

1. Talipes Verus.
2. Talipes Equinus.
3. Talipes Valgus.
4. Talipes Calcaneous.

Talipes Verus.—

This type of Talipes is also called Talipes Equino-Verus. This is the most common type of congenital Club Foot. The

chief characteristic is the peculiar position of marked inversion of one or both feet.

Symptoms.—The heel is drawn up, and the anterior half of the foot is adducted, and strongly inverted with the sole of the foot looking inwards. If the child is not properly treated early, the following deformities become marked as it grows older :—

1. The calf muscles get atrophied
2. The foot becomes stunted in growth, and the leg becomes shortened due to the arrested growth of the bone.
3. There develops a tendency to walk with the leg rotated inwards at the hip and as a result of continual walking on the outer side or even on the dorsal surface of the foot, the soft skin becomes thickened.

Anatomical Changes.—In a case of Talipes Verus, important anatomical changes take place when the child is in the uterus of the mother. The bones—Astragalus and the Os-calcis are mostly affected. It may be caused by the pressing of the wall of the uterus on the foot, and putting it into an inverted position.

In the adult Astragalus, the angle between the head and the neck is not appreciably marked, but in a normal infant, the angle is observed to be about 35° during birth, diminishing to 10° or 5° . Later on, during adult life, it becomes almost imperceptible. But in a case of Talipes Verus the angle is increased, and it may be about 40° degrees or more. At the same time, the neck becomes longer than normal, having its outer part lengthened, and the inner part shortened. The scaphoid is displaced to the inner side of the head of the Astragalus, and its tubercle comes close to, and even touches the inner malleolus. The ligaments on the inner side of the foot are contracted. The long and short planter ligaments are also contracted and shortened. All the Tarsal bones accommodate themselves in this peculiar and unnatural form acquired by the foot, and the shape becomes peculiar to this deformity.

Treatment.—When the child is born with Talipes, the treatment should be started as early as possible after birth. The first step in the treatment should be taken by the nurse who should be instructed to use manipulations, holding the foot in a good position for about 15 minutes four or five times daily. The Surgeon should attempt forcible correction twice or thrice a week, following light massage for 15 minutes, every time the manipulation is done.

After six weeks, the treatment should be started vigorously. Strong passive movements for correction of the deformity should be enforced, making use of eversion, abduction and dorsi-flexion twice daily.

Special apparatuses can be contrived. The patient lies on a table, his foot extending beyond its lower margin. The masseur holds the leg, and places a small piece of wooden block 1" thick (the length and breadth of the block being equal to that of the sole of the foot) against the sole of the patient's foot. Now the patient's foot as well as the block of wood are pressed *en masse* against the masseur's chest. The knee should be kept extended, and the foot should be everted throughout the manoeuvre.

During the interval between the passive movements, the corrected position should be maintained by fixing the limb on a suitable metal splint.

Later on, when the patient grows old enough to walk, the weight of the body helps him to put the entire sole of the foot on the ground, which as a matter of fact helps it to acquire the most normal position and correction. If this process be not very successful, surgical interference such as forcible fixation of the foot in a plaster of Paris case under chloroform, or Tenotomy of the Tendo-Achillis is necessary, followed by regular massage after the wound is healed up.

Passive exercises like the following should be attempted after the healing of the surgical wound :—

1. Extension.
 2. Flexion.
 3. Eversion.
 4. Inversion.
 5. Circumduction (in and out).
- } alternately. Number of movements 3 to 50.
 } alternately. Number of movements 3 to 50.
 3 to 50.

This form of passive movements should be continued for about a month, and the leg muscles should be massaged carefully before and after the movements.

After a month or so, the patient should be made to perform the above mentioned movements by himself, being helped by the masseur in the beginning. Number of movements 3 to 50.

Talipes Valgus.—

It may be *congenital* or *acquired*,

The *congenital* form of this type of deformity is rare.

The *acquired* variety is occasionally met with.

Causes.—The acquired form is produced as a result of spastic contraction of the Peronei or as a result of paralysis of the Tibial muscles.

Treatment.—By massage, passive movements and application of suitable boots, some improvements become obvious. If not, the foot should be wrenched into proper position, and fixed in a plaster of Paris casing. In very severe cases, surgical operations have been sought for, but the success is not so encouraging.

Talipes Calcaneous.—

It may be *congenital* or *acquired*.

In *congenital* cases—when the patient stands, the heel only touches the ground, the toes point upwards, and the sole forwards. The extensor tendons are contracted. The foot is sometimes

deviated in and sometimes outwards. When the foot is displaced inwards, it is called *Calcaneo-Verus* and when outwards, *Calcaneo-Valgus*.

In acquired cases, the cause is Infantile paralysis of the calf muscles. Over-stretching of the *Tendo-Achillis* after surgical operation such as *Tenotomy*, may also cause *Talipes Calcaneus*.

Symptoms.—The anterior half of the foot seems to drop forwards due to contraction of the planter fascia and the small muscles of the sole of the foot. There develops a large pad of fat over the *Calcaneal Tuberosities*, causing the longitudinal arch of the foot to be increased.

Treatment.—In the paralytic variety, some form of apparatus should always be worn. If it is not relieved, surgical operation should be resorted to.

CHAPTER XV
DISEASES OF JOINTS
SYNOVITIS

It is an inflammation of the synovial membrane in a joint. Other structures of the joint usually escape inflammation.

It may be :—

1. Acute.
2. Chronic.

ACUTE SYNOVITIS

Causes.—Local and constitutional.

- Local.**—1. Traumatic
2. Exposure to Cold.

Constitutional.—Gout, Rheumatism, Pyaemia, Syphilis and Gonorrhoea.

Traumatic Synovitis may be due to a blow on the joint, or severe stretching of the capsule or the ligaments, by a sprain or dislocation.

Morbid Anatomy.—There is inflammation of the synovial membrane of the joint involved, causing exudation of plasma and leucocytes into the substance of the membrane which becomes spongy and thickened. The exudation also collects into the synovial cavity which becomes distended. In the early stages, the exuded fluid is full of synovia, and is mixed with blood plasma which after some time may coagulate, depositing lymph on the articular surface. This lymph may be absorbed in the natural course of resolution, or adhesions will form, and the ligaments binding the joint get infiltrated and relaxed.

Symptoms.—The cardinal symptoms of inflammation are manifested.—

1. The joint feels hot to the touch.
2. The affected site becomes definitely hotter than the surrounding parts, and presents a red appearance.

3. There is pain of an aching type [felt, both on active and passive movements. In active movements of the muscles (affected), the pain will be greater and more limited than in passive movements of a similar type.
4. There is fluctuation present.
5. The muscles controlling the movements of the joint occasionally undergo atrophic changes, in course of 2 or 3 weeks.

General Treatment of Acute Synovitis.—1. Immobilization of the joint with a [avourable and easy position, so that subsequent Ankylosis may not result, and the limbs can be used in the future.

2. The patient should be kept in bed, with the affected limb elevated.

3. Cold by means of ice or some evaporating lotion should be applied on the (affected) joint. But in old subjects, application of cold is not advisable.

4. After 48 hours [rom the time of the injury, [omentation gives great relief.

5. Leeches may be applied to relieve the tension and the pain.

6. In case where the joints had greatly swollen, certain quantity of fluid may be aspirated out, and that will relieve the pain and expedite recovery.

7. During the sub-acute stage, light massage should be applied with some embrocation. But as the case gets into a more chronic stage, greater pressure should be applied during the massage, followed by dry fomentation. Passive and active movements of the joints should be attempted in this stage.

SYNOVITIS OF SPECIAL JOINTS

SYNOVITIS OF THE SHOULDER JOINT

The curvature of the shoulder is increased. The Deltoid muscle looks expanded, due to the accumulation of the synovial fluid under it. There is a painful swelling in the axilla.

Treatment.—The shoulder should be bandaged to the side, the arm kept in a sling, and the forearm kept in a semi-flexed position. Further treatment is described under the heading of General Treatment mentioned above.

SYNOVITIS OF THE ELBOW JOINT

Symptoms.—The swelling in front of the joint is not much marked. It is more marked behind on either side of the olecranon process of the ulna.

Treatment.—The limb should be put on an internal angular splint, the hand kept midway between pronation and supination, and the elbow flexed to a little more than a right angle.

Further treatment is indicated under the heading of General Treatment.

SYNOVITIS OF THE WRIST JOINT

Symptoms.—Both the anterior and the posterior aspects of the joint get swollen. Fluctuations are marked under the extensor tendons of the wrist.

Treatment.—Rest ; the hand should be put on a Palmer splint right up to the forearm which is to be kept semi-flexed with the hand midway between pronation and supination.

Further treatment is described under General Treatment.

SYNOVITIS OF THE KNEE JOINT

This joint very commonly suffers from acute Synovitis. When there is an accumulation of fluid in the joint, it acquires a very marked rounded outline. All the normal hollows disappear. The swelling may extend some three or four inches above the Patella. Fluctuation can easily be felt. When the effusion is great, "Patellar tap" (when the leg is extended, and is supported from underneath, the patella can be made to tap against the inter-condyloid notch of the femur) can be felt on pressing the Patella sharply backwards.

Treatment.—The knee should be put on a back splint and slightly flexed.

Further treatment is indicated under General treatment.

SYNOVITIS OF THE HIP JOINT

It cannot be very easily detected. There is slight fullness, and the joint is tender on pressure. The fullness is moderately marked in the outer and upper part of the "Scarpa's Triangle." Due to accumulation of fluid in the joint, the thigh acquires the position of flexion, abduction and eversion. The movement is very limited, and it is painful during the act.

Treatment.—The limb should be fixed on a "Liston's long splint", or the whole limb should be placed between sand bags, and an extension apparatus applied.

For further treatment refer to the General Treatment of Acute Synovitis.

CHRONIC SYNOVITIS

Causes.—It may follow an acute attack of Synovitis which has not been properly treated, or the attack may be a severe one from the very outset, and later on becomes chronic. The knee joint is often a site favourable for chronic Synovites.

Morbid Anatomy & Symptoms.—The capsule is thickened, the inner surface of the Synovial membrane gets roughened due to an increase of connective tissue.

The synovial fringes become hypertrophied. In the knee joint, the synovial fringes may be felt rolling under the fingers, and the loose ends of these hypertrophied fringes give rise to severe and painful symptoms. Due to the roughening of the articular surfaces on which lymph has been deposited, creaking in the joint is occasionally felt.

The joint becomes pretty weak. It gets quickly tired after movement for a short time, or pain starts after the movement.

Stiffness is experienced after it has been kept at rest for some time.

The muscles get usually atrophied.

Treatment.—The joint should be placed in a suitable position, and pressure should be applied. "Scott's dressing" may be tried for some period. If the condition is a very chronic one, fomentations and application of some stimulating liniment should be resorted to, followed by deep massage with friction and tapotement. Massage should be given regularly to the muscles where atrophy has set in. Passive movements are very useful, and when some improvement has manifested, active movements should be encouraged.

Passive and active movements are recommended for the special joints affected with Chronic Synovitis:—Passive movements imitating the following exercises, should be first tried for sometime before any active exercise is attempted.

SHOULDER JOINT

Exercises :—

Group I.—Exercises Nos.—58, 55, 44, 45, 46, 46(a), 6, 8, for a month, and then—

Group II.—Exercises Nos.—18, 9, 14, should be continued along with Group I for a long time.

ELBOW JOINT

Exercises Nos.—3, 4, and circumduction of the joint in and out alternately, also pronation and supination of the forearm alternately.

WRIST JOINT

Exercises :—

Group I.—Exercises Nos.—48, 49, 50.

Group II.—Exercises Nos.—11, 12, with Indian-clubs, movements specially circumduction in and out, of the wrist joint with a pair of very light clubs (2 to 4 lbs a pair) to start with.

KNEE JOINT

Exercises :—

Group I.—Exercises Nos. 51, 54, 13, also circumductions in and out of the joint to a certain extent in front.

Group II.—Group I and in addition walking, followed by jog-trot and finally running with moderate speed may be attempted.

ACUTE ARTHRITIS

It is an acute inflammation of all the structures of a joint *e.g.*, bones, cartilages and ligaments, also of the synovial membrane.

Causes.—The inflammation is almost always due to some bacterial infection of the joint cavity. The bacteria may get into the cavity from a Trauma on the joint, or they may be pyogenic organisms of some endogenous type. *Streptococcus pyogenes* is the most common type that affects the joints.

An acute infective fever causing the inflammation of a joint is very common, as during that time the vitality of the subject is very low. Slight sprain or some damage caused to a joint may be the source of infection. It may be the sequela of some infective fever, *e.g.*, Enteric or Pneumonia. The joint may be infected by Gonorrhoeal poison present in the subject, or extension of an inflammation from the end of a bone affected already in the neighbourhood. It may be of an acute rheumatic origin.

Morbid Anatomy.—At first, the synovial membrane becomes infiltrated, and is converted into granulation tissue from within outwards. There is plenty of pus exuded from the membrane. The ligaments binding the joint become soft and oedematous, get relaxed and finally become displaced.

The articular cartilages are disintegrated. The central portion, due to pressure between the ends of bones soon disintegrates

and disappears. The suppurative inflammation spreads along the under surface, separates the cartilage from the bone, and gradually the cartilage gets necrosed. The inter-articular cartilages are similarly destroyed, and disappear. The ends of the bones get necrosed in a similar way and destroyed. The periosteum covering the ends of the bones gets inflamed. The muscles around and in the neighbourhood of the joint become atrophied, and undergo fatty degeneration.

Symptoms.—The symptoms of an acute synovitis manifests in a severe form. There is severe pain with fever, the joint is swollen, the fluid inside becomes purulent, the surrounding tissues get inflamed and oedematous. The joint consequently attains a semiflexed position.

The patient may die of Pyrexia in the acute condition, or the joint may get ankylosed.

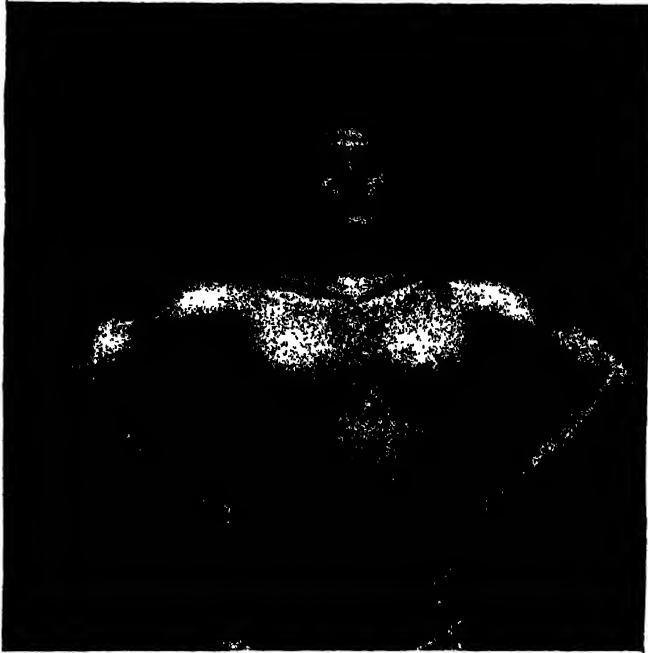
Treatment.—At first, the limb should be absolutely immobilized and elevated to a comfortable position. For about 24 or 36 hours since the commencement of the symptoms, cold lotions or ice-bags should be applied, then hot fomentations for an hour thrice daily should be given, and the joint should be kept bandaged for the rest of the day and night. If there be dislocation, it should be reduced; and the limb suitably supported for about a fortnight.

If signs of suppuration set in, surgical interference is at once needed. Ankylosis is often expected after operation; but in certain cases, joints may be rendered useful by proper massage and passive movements during and after the healing of the surgical wound.

ACUTE ARTHRITIS OF SPECIAL JOINTS

SHOULDER JOINT

Causes.—The synovial capsule of the shoulder joint is weakest at the axilla. So micro-organisms may invade the joint very easily through this part. Some penetrating injury in the joint often causes this inflammation.



Mr. Akshoy Kumar Sen.

**After an attack of double Pleuro-pneumonia, suffered from Acute Arthritis -
Has been cured of Arthritis under the Author's treatment, and has
acquired immense physical improvement.**

(Facing page 362)

Symptoms.—Severe pain is experienced in any movement of the joint. The pus may find its way under the skin in those places in the axilla where the capsule is pretty weak—in the anterior and posterior borders of the Deltoid muscle.

Treatment.—In milder cases, general treatment of Acute Arthritis should be resorted to. If the inflammation is severe, and pus is formed, surgical interference with excision of the head of the bone is necessary.

Physical Treatment.—Regular and light massage round the surgical wound during its healing period, and massage with greater pressure, also passive movements after the healing of the wound, are necessary to render the limb useful in the future. Usually, the shoulder joint becomes useful after careful and proper treatment.

ACUTE ARTHRITIS OF THE ELBOW JOINT

Symptoms.—All the symptoms of an Acute Arthritis are present. Pronation and supination are very painful.

Treatment.—The limb should be fixed in a rectangular splint, the forearm kept midway between pronation and supination, and the arm is kept elevated on a pillow. In severe cases, surgical operation such as evacuation of pus with excision of the heads of the radius and ulna is effected as soon as the acute stage passes off.

Later, massage and passive movements are necessary to get an useful forearm.

In children, heads of the bones are not excised, but ankylosis is allowed to go on, so that the long bones may grow; and after the adult stage has reached, excision is performed with breaking of ankylosis followed by after treatment.

ACUTE ARTHRITIS OF THE HIP JOINT

Causes.—Acute Arthritis of the Hip Joint due to any penetrating injury is a very rare occurrence. Usually it is the sequela of an acute infective osteomyelitis originating in the upper end of

the femur. As the cartilage is inside the capsule, the joint is involved very easily.

Symptoms.—There is intense pain. The local temperature is usually high. The limb is flexed and everted. Suppuration takes place if the case is not properly attended to very early.

Treatment.—In the acute stage, general treatment of acute Arthritis is indicated. If suppuration ensues surgical interference is necessary.

ACUTE ARTHRITIS OF THE KNEE JOINT

The knee joint is the most common site for an Acute Arthritis.

Causes.—The inflammation is almost always due to an injury to the joint causing the infection to affect the joint from outside.

Symptoms.—The pain is very severe and acute. The joint becomes hot, and distended to a very great size. The leg assumes a semiflexed condition, and becomes inert with the thigh everted.

If not properly treated in the beginning, there is every chance of the joint getting suppurated. The pus extends upwards into the anterior aspect of the thigh beneath the Vastus Externus or downwards into the leg. Eventually the pus finds its way under the skin.

Treatment.—In the early stage, general Treatment of acute Arthritis is indicated. If unsuccessful, and the pus is formed early, surgical interference such as evacuation of the pus through both sides of the patella is imperative.

As soon as the surgical wound heals up, proper massage and passive movements will save the patient.

Passive Movements.—The patient should sit on a chair with the legs hanging, the masseur should hold the foot in the middle, and give flexion and extension movements at first slow and limited, but gradually increasing in range and number. Number of movements (3 to 50).

After regular passive movements and massage for three weeks, the patient should be assisted in attempting active movements followed by massage as before. Number of movements 1 to 50.

After performing active movements of the joint for about a month and a half, the patient should be helped in standing up and practise walking slowly with support. Massage should be applied after walking.

RHEUMATIC SYNOVITIS

This is found usually in the course of an acute Rheumatic fever. The bacteria gain entrance into the body through the mucous membrane of the throat, and thence carried into the blood, get themselves lodged into the synovial membranes of the joints and in the Pleura or Pericardium.

Symptoms.—There are rise of temperature to about 101° , acid sweats and high coloured urine saturated with Lithates. There are tenderness and swelling in one joint or in a number of joints affected. Complete resolution generally follows; but in several cases, thickening of ligaments ensues, and consequently the mobility of the joint is seriously impaired.

Treatment.—During the acute period, the joint should be kept at rest and in a comfortable position, and fomentations applied. Other anti-rheumatic applications and internal administrations are imperative.

If the case does not yield to the former treatment, and gets into a chronic form, particular attention should be paid to the diet of the patient. Rich food should be religiously avoided; bland diet is necessary. Mineral waters do a lot of good to the constitution. Hot air-baths to the affected part, massage, and later on passive movements are very useful.

OSTEO-ARTHRITIS

(Rheumatoid Arthritis, Arthritis Deformans)

Causes.—It usually occurs between the ages 20 and 45 and in people having worry, anxieties and defective nutrition. It

is more common in women than in men. Exposure to a damp climate, prolonged gastric catarrh, habitual constipation and pyorrhoea are the common causes. Sometimes, an injury, such as a sprain, fracture or dislocation precedes this affection.

The most reasonable cause is acidosis in the system, attended with Calcium deficiency. In healthy condition, there is formed certain acids *e.g.*, Lactic, Uric, and Oxalic acid etc., in the system. In order to neutralise the acidosis, certain quantity of calcium or lime is needed. If this calcium is not supplied in sufficient quantity by way of daily food in-take, the system is invaded for want of lime which is indispensibly necessary. Joints of the body are very rich in calcium. As a result of this, owing to deficiency of calcium, the joints tend to swell, causing Arthritis.

General Symptoms.—The characteristic features are swelling and pain in the affected joint which usually assumes a spindle shape.

1. There is pain in one or more joints with stiffness and limitation of movements.
2. Creaking or even grating on movement is marked. The pain usually manifests in the joints of the fingers and hands, then extends to the feet, knees and the hip joints.
3. The pain and the other symptoms are worst in the early morning when the patient gets up. But it usually gets better as the day advances.
4. The ends of the affected bone gets thickened.
5. The joint gets deformed.
6. The muscles moving the joint get atrophied,
7. The movements of the limb become limited.
8. There is digestive trouble.
9. Acute recurrence is very common.

Morbid Anatomy.—At first the matrix of the articular cartilage of the joint cracks; it undergoes fibrillous changes, and looks like a mass of velvet. The cartilage is worn

out first by softening, and then undergoes degeneration. The surface of the head of the bone is exposed, and gradually becomes sclerosed and polished. On the margin, Osteo-phytic growths occur, and gradually a rim-like growth is formed on the head. These osteo-phytes often attain large size and eventually cause ankylosis. The synovial membrane is thickened, the villi grow big in size and could be felt rolling under the finger through the skin. Occasionally nodules of cartilage develop in the villi of the synovial fringes which later on get hardened, and ossified. If detached, they become loose cartilages.

Different varieties of Osteo-Arthritis that usually come under treatment are :—

1. Chronic Monarticular Type.
2. Acute Polyarticular Type.
3. Chronic Polyarticular Type.

Chronic Monarticular Type.—It is the most common type found.

Causes.—This usually follows quickly after an injury *e.g.*, fracture of the neck of the femur.

Symptoms.—The first symptom is troublesome pain and stiffness in the joint. There is fine creaking felt on movement. Certain amount of swelling is manifested if there be some effusion. The pain seems to increase when the patient lives in a place having damp surroundings. If the limb be kept at rest for some time, the pain is very marked as soon as it is used, but after some movements it becomes less. As the trouble gets chronic, the ends of the bones of the joint become more and more thickened, making the limb quite deformed. Occasional exacerbation of symptoms brings in increased deformity. Eventually the whole limb becomes crippled completely.

Acute Polyarticular Type.—It more usually affects younger people, and females rather than males. It is a sequela of some infective fever such as Influenza, Tonsillitis etc., There is distinct rise of temperature, Tachycardia and rapid muscular wasting.

Smaller joints *e.g.*, Inter-phalangeal joints are usually affected at first, then gradually the trouble extends to the other larger bones.

Chronic Polyarticular Type.—This is often found in women without any injury and in people of middle age. It may spread from one to the other joint, or several joints may get involved simultaneously. It usually starts in one or more terminal phalangeal articulations which gradually get stiff, painful and swollen. By degrees, small nodules of bones grow at the base of the phalanges. The trouble extends to other joints, and eventually makes the subject crippled.

Treatment.—Constitutional treatment is imperative. The patient should be warned against exposure to chill or draught. Worries and all sources of anxieties should be avoided. The general constitution should be improved by wholesome and nutritious food. Cod Liver oil may be administered. Natural waters do a lot of good.

Dietetic Treatment.—The diet should be rich in organic calcium which is in an assimilable form. Exclusive milk diet is the best form of treatment in Arthritis. The food should contain celery, lettuce and spinach. Milk and fresh fruits should be taken in sufficient quantity. Lard, beef-sweats and margarine should be strictly avoided ; the intake of white sugar should be cut down to a minimum as it tends to produce an excessive quantity of Oxalic acid in the system, and in order to neutralize this Oxalic acid, sufficient quantity of organic calcium is extracted from the tissues, usually from the joints, and especially from the knee joints which are very rich in organic calcium. Being robbed of this calcium material, the joints become subject to Arthritis.

The following combination of food articles is a good menu for the daily diet of an Osteo-arthritic patient :—

8 a.m. 1 glass of water.

Breakfast.....Tea or coffee and saccarine, but no milk.

1 slice toast, but no butter.

Boiled sole or haddock.

Fresh fruits.

1 p.m..... 1 tumbler-ful of water.

Lunch.....3 or 4 ozs. of chicken. There should not be any fat with the gravy at all.

Green salad well boiled, plain—without oil, should be taken. Beet root, cabbages and carrots should be omitted.

Wholemeal bread toasted 2 oz.

Small cup of coffee, milk with cream, but no sugar. Fresh fruits in moderate quantity.

5 p.m.....A cup or two of Tea without milk or sugar.

Half an hour before dinner a tumbler of water.

Dinner2 or 3 ozs. of sole, cod or turbot.

Sallad and cooked vegetables.

Coffee.

Fresh fruits.

Local Treatment and Treatment by Physical Exercise.—

The joint should be protected from cold and injury by some flannel covering Stimulating liniments should be applied. Regular and systematic massage, also passive followed by active movements should be resoured to.

Passive movements should be started early to keep the joints flexible. If the joint cannot be moved to its fullest extent, the masseur should bend and extend it slowly, carefully and gradually.

The muscles should be properly massaged to avoid wasting. Gentle strokings should be given as they will relieve acute pain.

After the swelling and pain have subsided; the patient should start active light movements. To start with, free swinging movements of the affected limb, should be encouraged for a few days before resistance exercise of any kind is attempted.

Group II.—42, 42(a), 43.

Group III.—9, 18, 20.

Group IV.—15.

OSTEO-ARTHRITIS OF THE KNEE JOINT

Treatment.—General Treatment of Osteo-Arthritis. After a few weeks of massage and passive movements, the following exercises should be attempted :—

Exercises Nos.—13, 51, 54, 55. and later on Ex. 53, 9, and 15(a) should be added to the chart.

OSTEO-ARTHRITIS OF THE ANKLE JOINT

Treatment.—General Treatment of Osteo-Arthritis. After three weeks of massage and passive movements, the following exercises should be practised :—

Exercises Nos.—52, 52(a), 52(b).

NEURALGIC JOINTS

Young women of neurotic temperament, and especially people with hysterical diathesis are susceptible to this trouble.

In Neuralgic joints, the pain is usually very superficial, and is not strictly confined to the joints. The joint is found to be perfectly free when it is examined under anaesthesia, or the attention of the patient is cleverly diverted. No effusion is present in the joint cavity.

Treatment.—Local and constitutional,

Local.—Cold douche, later on counter-irritation by liniments or blisters also massage, and later on, regular light resistant exercises of the joint should be resorted to.

Constitutional.—Attempts should be made to improve the general constitution by change of climate and light also nutritious diets.

1 p.m. 1 tumbler-ful of water.

Lunch 3 or 4 ozs. of chicken. There should not be any fat with the gravy at all.

Green salad well boiled, plain—without oil, should be taken. Beet root, cabbages and carrots should be omitted.

Wholemeal bread toasted 2 oz.

Small cup of coffee, milk with cream, but no sugar. Fresh fruits in moderate quantity.

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Dinner 2 or 3 ozs. of sole, cod or turbot.

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Coffee.

Fresh fruits.

Local Treatment and Treatment by Physical Exercise.—

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Constitutional.—Attempts should be made to improve the general constitution by change of climate and light also nutritious diets.

EXERCISES

EXERCISE No. 2



Fig. 3



Fig. 4



Fig. 5

Position.—Stand as in Fig. 3 with "Eyes Front".

Process.—Turn your face to the right as shown in Fig. 4. Take in full breath during the movement. Look as far back as you can. Return to the original position Fig. 3. Relax the muscles, and breathe out during the process.

Try a similar movement on the left side, and assume position as in Fig 5., breathing in full during the process. Relax the muscles, breathe out, and assume the original position as in Fig. 3.

Time required.—One second for each movement.

EXERCISES

EXERCISE No. 2



Fig. 3



Fig. 4



Fig. 5

Position.—Stand as in Fig. 3 with "Eyes Front".

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Try a similar movement on the left side, and assume position as in Fig 5., breathing in full during the process. Relax the muscles, breathe out, and assume the original position as in Fig. 3.

Time required.—One second for each movement.

EXERCISE No. 3



Fig. 6



Fig. 7

Position.—Stand erect as in Fig. 6.

Process.—Close your right hand firmly, take in full breath, and along with it bend the right forearm on the upper arm—assume position as shown in Fig. 7. Breathe out, relieve arm, and regain the original position as in Fig. 6. Repeat the same process on the left arm, and so on alternately.

EXERCISE No. 3(a)

Follow Exercise No. 3, but do not close the hands into fists. Keep the palm of the hands extended throughout the exercise.

Time required.—One second for each movement.

Number of movements.—5 to 50 in each hand.

EXERCISE No. 4



Fig. 8



Fig. 9

Position.—Stand erect with both hands making fists, and touching the chest as shown in Fig. 8.

Process.—Extend the right forearm and hand; and assume position as in Fig. 9, taking in full breath during the movement. Breathe out, and regain the original position as in Fig. 8. Repeat the same on the left arm, and so on alternately.

Time for each movement.—One second.

Number of movements.—5 to 50 in each hand.

EXERCISE No. 5



Fig. 10

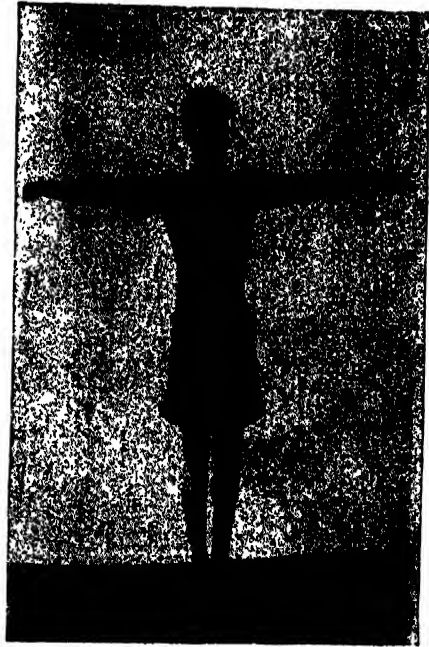


Fig. 11

Position.—Stand erect as in Fig. 10, with steady arms.

Process.—Lift both arms up to the shoulder level as shown in Fig. 11, taking in full breath during the movement. Bring down the arms simultaneously, and regain the original position as in Fig 10, breathing out during the movement.

Repeat as many times required.

EXERCISE No. 6

**Fig. 12**

Position.—Stand erect as in Fig. 12, and take in full breath.

Process.—Breathe out, and assume position as in Fig. 13, putting attention to the muscle "Trapezius" on both sides. Breathe in, and assume the original position as in Fig. 12.

Repeat as many times required.

**Fig. 13**

EXERCISE No. 7



Fig. 14



Fig. 15



Fig. 16

Position.—Stand erect as in Fig. 14, with the elbows drawn well behind.

Process.—Take in full breath, push forwards both elbows simultaneously with pressure downwards, and assume positions as in Figs. 15 and 16, putting attention to the muscle "Latissimus Dorsi". Breathe out during the process, and regain the original position as in Fig. 14. Repeat.

EXERCISE No. 7(a)

Especially for Latissimus contraction.

Position.—Stand erect as in Fig. 14, with the elbows well close behind.

Process.—Take in full breath, push forwards both elbows simultaneously with pressure downwards, and assume position as in Fig. 15. Hold breath, and forcibly contract the muscles Latissimus Dorsi, assuming position as in Fig. 16. Breathe out, and regain the original position as in Fig. 14. Repeat as many times required.

EXERCISE No. 8



Fig. 17



Fig. 18

Position.—Stand erect, take in full breath, and assume position as in Fig. 17.

Process.—Close both elbows towards the middle line of the body as shown in Fig. 18. Breathing out during the process. Repeat, taking in full breath again, and assume the original position as in Fig. 17.

Repeat as many times required.

EXERCISE No. 8(a)

Especially for the contraction of the Pectoralis muscles.

Position.—Stand erect, assuming position as in Fig. 17.

Process.—Take in full breath, hold breath, close both elbows towards the middle line of the body, and assume position as shown in Fig. 18, putting attention to the "Pectoralis Major" muscles. Hold breath for two seconds, and breathe out. Repeat.

EXERCISE No. 9



Fig. 19



Fig. 20

Position.—Assume position as shown in Fig. 19, by touching the toes of the feet with the tips of your fingers, and breathe out.

Process.—Start taking in breath, and making a swinging movement upwards, assume position as shown in Fig. 20, breathing in full during the movement. Return to the original position as in Fig. 19, breathing out during the movement. The down and up movements will take one second each. Repeat the whole process as many times required.

Attention should be given to the muscles of the abdomen when doing the downward movement, and to the muscles of the loins during the upward movement.

EXERCISE No. 10



Fig. 21



Fig. 22



Fig. 23

Position.—Stand erect as in Fig. 21.

Process.—Breathe out slowly, and draw the abdominal wall gradually inwards. Try to push the abdomen as far back as the Vertebral column, making a depression in the abdomen as shown in Fig. 22. Proceed taking in full breath, swell the abdomen as shown in Fig. 23. Now start breathing out with full attention to the muscle Rectus Abdominis. Regain the original position as in Fig. 21. Repeat.

Each movement—drawing in, and blowing out the abdomen, will take two seconds.

EXERCISE No. 10(a)



Fig. 24



Fig. 25



Fig. 26

Position.—Stand slightly bent forwards, with your hands resting on the upper part of the thigh as shown in Fig. 24.

Process.—Breathe out, draw in the abdomen, making a depression as shown in Fig. 25. Now hold breath, and try to push the Rectus Abdominis muscle forwards as shown in Fig. 26. Try to move the muscle backwards and forwards for a number of times, holding breath all the while. Release control of the muscle, and breathe in.—Repeat.

The number of the forward and backward movements of the "Rectus" muscle should not be more than 5, while holding each breath.

✓ EXERCISE No. 11



Fig. 27



Fig. 28

Position.—Stand erect as shown in Fig. 27, with the fingers folded (made into a fist), and the forearms extended.

Process.—Turn the fist inwards (towards the body), with contraction of the Flexor muscles of the forearm, and assume position as shown in Fig. 28.

Extend the forearm by contracting the Extensor muscles of the forearm and turning the fists outwards. Repeat.

There is no change in breathing during the process.

EXERCISE No. 12



Fig. 29



Fig. 30

Position.—Assume position with the palms of the hands extended as shown in Fig. 29.

Process.—Make a firm grip in the fist (left hand). Contract the flexor muscles of the left forearm by a twisting movement forwards, and assume position as in Fig. 30. Try this alternately on both forearms.

Repeat as many times as required.

EXERCISE No. 13



Fig. 31



Fig. 32

Position.—Stand erect, holding the top of the back rest of a chair, with both hands, as shown in Fig. 31, and be steady.

Process.—Contract the Biceps of the left thigh, and assume position as in Fig. 32. Relax the leg and assume the original position Fig. 31. Try the same process on the right thigh, and so on alternately.

EXERCISE No. 14



Fig. 33

Position.—Take position as in Fig. 33, with your hands and feet well apart—hands 20 inches minimum for a moderate sized adult, and 30 inches to 36 inches for a tall and broad chested adult. Keep your feet 2 to 3 feet apart, according to the size of the lower limbs, and take in full breath.

Process.—Start breathing out, and attain position as in Fig. 34, take a dip, and attain position as in Fig. 35. Then with a swing forwards attain position as in Fig. 36, and breathe out complete,



Fig. 34

**Fig. 35**

with these movements. Attempt to regain the original position as in Fig. 33, breathing in full during the process.

Repeat the whole process as many times required.

Time taken 3 seconds for the whole manoeuvre.

**Fig. 36**

EXERCISE No. 15



Fig. 37



Fig. 38

Position.—Stand erect as in Fig. 37, with your feet about a foot or 16 inches apart.

Process.—Make a deep knee-bend, and attain position as indicated in Fig. 38. Breathe out during the bend. Regain the original position, breathing in full during the process. Repeat.

EXERCISE No. 15(a)



Fig. 39



Fig. 40

Position.—Stand erect with your hands resting on the waist, the toes kept well apart, and the heels together, making a right angle with the inner sides of the feet, as shown in Fig. 39.

Process.—Make a deep knee-bend, putting the body weight on the toes; and raising the heels at the same time, assume position as in Fig. 40. Breathe out during the bend. Regain the original position, breathing in full during the process. Repeat.

EXERCISE No. 16



Fig. 41



Fig. 42

Position.—Stand erect as in Fig. 41, with the heels touching each other, and the toes kept well apart, making a right angle with the inner sides of the feet.

Process.—Lift the whole body by standing on your toes, and assume position as shown in Fig. 42. Regain the original position, and so on. Repeat.

EXERCISE No. 16(a)



Fig. 43



Fig. 44

Position.—Stand erect as in Fig. 43, with the toes kept close, practically touching each other, and the heels wide apart, making an angle of 45° — 60° degrees at the toes with the inner sides of the feet.

Process.—Lift the whole body by standing on your toes, and raising the heels as shown in Fig. 44. Regain the original position as in Fig. 43, and so on. Repeat.

✓ EXERCISE No. 17



Fig. 45



Fig. 46



Fig. 47

Position.—Stand erect with the arms extended at right angles to the body, as shown in Fig. 45.

Process.—Bend your body towards the left, and assume position as in Fig. 46, breathing out during the process, also paying attention to the muscles of the left side of the trunk. Return to the original position as in Fig. 45, and breathe in full. Repeat a similar movement on the right side, breathing out, and paying attention to the muscles of the right side of the trunk, as shown in Fig. 47. Regain the original position Fig. 45, breathing in during the movement. Repeat as many times required.

EXERCISE No. 18



Fig. 48



Fig. 49

Position.—Stand erect with "Eyes Front," and the arms extended at the shoulder level as shown in Fig. 45, taking in full breath at the same time.

Process.—Bend down the trunk with a sharp twist towards the left, and touch the left foot with the right hand as shown in Fig. 48, breathing out with the movement. Regain the original position as in Fig. 45. Bend the trunk with a similar twisting movement on the right side, touching the right foot with the left hand as shown in Fig. 49, and breathing out. Regain the original position as shown in Fig. 45. Proceed alternately as many times as required.

EXERCISE No. 19



Fig. 50



Fig. 51

Position.—Stand with the arms folded behind the head, bend down, breathe out, and assume position as shown in Fig. 50.

Process.—Start breathing in, and assume positions consecutively as shown in Figs. 51, 52 and 53 ; and finally return to the original position as in Fig. 50, completing a circular movement against the hands of a watch, making the waist as the axis. Go on breathing in, till you assume position as in Fig. 52, and then start breathing out. Breathe out completely as you assume the position shown in Fig. 50. Start breathing in again, and make similar circular movements, also breathe as many times as required.



Fig. 52



Fig. 53

EXERCISE No. 19(a)

Start from the position as shown in Fig. 50. Make a circular movement with the hands of a watch, along with the breathing works same as in Exercise No. 19. Repeat as many number of times as required.

EXERCISE No. 20



Fig. 54

Position.—Stand erect with the feet wide apart (16 to 20 inches) and the hands on the waist, as shown in Fig. 54, and take in full breath.

Process.—Extend the right arm downwards and outwards, quickly bending the body along with it, and attain position as in Fig. 55; breathing out during the process. (Time taken one second). Regain the original position as in Fig. 54, and Breathe in full during the movement,



Fig. 55

Start similar movement on the left side, and assume position as in Fig. 56. Regain the original position as in Fig. 54, breathing in full during the process.

Repeat as many times required.



Fig. 56

EXERCISE No. 21



Fig. 57

Position.—Sit erect on an armless chair, with the hands on the waist as shown in Fig. 57, and breathe in full.

Process.—Bend the trunk, and assume position as shown in Fig. 58, breathing out during the process. (Time taken during the movement is one second). Rise again, and attain the original position as in Fig. No. 57, breathing in full, during the process. (Time taken during the movement is one second).



Fig. 58

EXERCISE No. 22



Fig. 59

Position.—Sit on the floor, with the feet wide apart as shown in Fig. 59.

Process.—Turn towards the right with a slow twisting movement of the body, and attain position as in Fig. 60, breathing in full during the movement. Quickly regain the original position Fig. 59, breathing out during the process. Start a similar movement on the left side, and assume position as in Fig. 61, breathing in full. Return to the original position as in Fig. 59, breathing out quickly.

**Fig. 60**

Repeat the process as many times as required.

Time taken during the process :—

Right side—Breathing in—2 seconds, and breathing out 1 sec.

Left side—Breathing in—2 seconds, and breathing out 1 sec.

**Fig. 61**

EXERCISE No. 23



Fig. 62

Position.—Sit on the floor with the feet wide apart, as shown in Fig. 59.

Process.—Touch your Right toe with both hands extended as shown in Fig. 62, breathing out during the process. Regain the original position as in Fig. 59, breathing in during the process. Touch your Left toe with both hands extended as shown in Fig. 63, and breathing out during the movement. Regain the original position and breathe in. Repeat.



Fig. 63

EXERCISE No. 24



Fig. 64

Position.—Sit on the floor with the feet wide apart and the arms folded behind the head as shown in Fig. 64, and breathe in full.

Process.—Bend the trunk towards the Right with a twisting movement, and assume position as shown in Fig. 65, breathing out during the movement. Regain the original position as in Fig. 64, and breathe in again. Now bend the trunk towards



Fig. 65

the Left, making a twisting movement, and assume position as shown in Fig. 66, breathing out during the movement. Return to the original position Fig. 64, and breathe in as before.

Repeat.

Time taken for each movement.—2 seconds.



Fig. 66

EXERCISE No. 25



Fig. 67

Position.—Sit on the floor with your feet wide apart as shown in Fig. 67, and take in full breath.

Process.—Make a slow bend on the Right side, and assume position as shown in Fig. 68, breathe out during the process. Assume the original position as in Fig. 67, and breathe in full. Make a similar bending movement on the left side, and assume

**Fig. 68**

position as shown in Fig. 69, breathing out during the process. Regain the original position as in Fig. 67, breathing in full.

Repeat the process as many times as required.

Time taken for each movement—2 seconds.

**Fig. 69**

EXERCISE No. 26



Fig. 70

Position.—Lie down flat on your back as shown in Fig. 70, keeping the arms parallel with the body and the palm of the hands facing as well as touching the floor.

Process.—Lift your legs together, throw them towards your head making a semicircular movement, and assume position as shown in Fig. 71. Breathe out during the movement. Return to the original position as in Fig. 70, and breathe in full during the process.

Repeat as many times as required.



Fig. 71

EXERCISE No. 27



Fig. 72

Position.—Lie down on the floor or on a bench with your arms folded behind the head, and the feet tied to the gratings of the window or to any similar object, to assume position as in Fig. 72.

Process.—Breathe out, bend trunk forwards, and assume position as in Fig. 73. Return to the original position Fig. 72., breathing in full during the movement.

Repeat the whole process as many times as required.



Fig. 73

EXERCISE No. 27(a)



Fig. 74

Position.—Lie on a bench flat on your back, having the legs of the bench towards your feet raised, so that the legs of the bench towards your head makes an external angle of 60° or 70° with the ground as shown in Fig. 74, and your feet tied to the distal end of the bench, or to some suitable object such as the gratings of the window, with a strap. The arms are raised at full length above head, or folded behind the head as shown in Fig. 74.

Process.—Breathe out, and bend trunk, in a similar way as in Ex. No. 27. Return to the original position as in Fig. 74., breathing in full.

Repeat.

EXERCISE No. 27(*b*)

Fig. 75

Position.—Assume position as in Fig. 74.

Process.—Breathe out, and bend trunk with a twisting movement towards the right, and assume position as shown in Fig. 75. Breathe in, and regain the original position Fig. 74.

Breathe out again, and assume position as in Fig. 76 ; bending the trunk with a twisting movement towards the left. Breathe in full, and regain the original position as in Fig. 74. Follow the process bending the trunk right and left alternately.

Repeat as many times required.



Fig. 76

EXERCISE No. 28



Fig. 77

Position.—Sit on the floor with your lower extremities extended and bent at right angles to the trunk as indicated in the Fig. 77.

Process.—Try to lift the whole body a few inches above the ground, and assume position as shown in Fig. 78. If your



Fig. 78

arms are not long enough, place your hands on two blocks of wood (each having the size of a piece of brick—ten inches). Remain in that position for two seconds, holding your breath. Release your arms, and assume the original position as in Fig. 77, and take in breath again.

Repeat.

This exercise should not be attempted unless the Muscle Rectus Abdominis is sufficiently strong.

EXERCISE No. 29

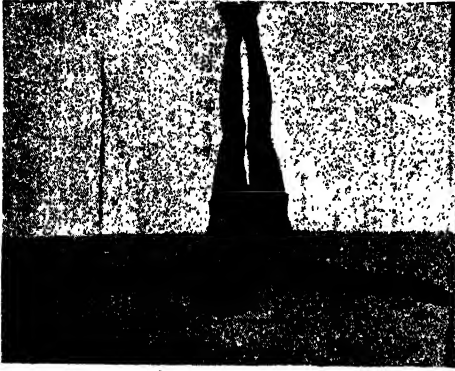


Fig. 79

Position.—Lie on your back on the ground, lift both legs together, and assume position as in Fig. 79, breathing in full during the process, and resting both arms firmly on the ground.

Process.—Now turn both legs together towards the right, and assume position as shown in Fig. 80, breathing out during



Fig. 80

**Fig. 81**

the movement. Return to the original position Fig. 79, breathing in at the same time.

Breathe out, and turn both legs towards the left as indicated in Fig. 81. Breathe in, and regain the original position as in Fig. 79.

Repeat the whole process as many times required.

EXERCISE No. 30



Fig. 82

Position.—Lie on your left side as shown in Fig. 82.

Process.—Lift the right leg as shown in Fig. 83. Lower the leg and assume the original position Fig. 82.

Repeat as many times required.



Fig. 83

EXERCISE No. 30(a)

Position.—Lie on your right side.

Process.—Follow the same process with the left leg, in a similar way as mentioned in Exercise No. 30.

Repeat as many times required.

Muscles.—Abductors Thigh.

Breathing.—Breathe in while lifting the leg, and breathe out while lowering the limb.

EXERCISE No. 31



Fig. 84

Position.—Lie on your face on the floor, as shown in Fig. 84.

Process.—Lift the lower extremities Right and Left alternately as shown in Fig. 85 and 86 respectively, breathing in during lifting, and breathing out when lowering the limb.

Repeat as many times required.



Fig. 85

EXERCISE No. 31(a)



Fig. 86

Assume position as in Fig. 84. Lift both legs simultaneously as shown in Fig. 87, breathing in when lifting the legs. Breathe out, and assume the original position as in Fig. 84.

Repeat as many times required.



Fig. 87

EXERCISE No. 32



Fig. 88

Position.—Sit on the floor with your feet wide apart and the arms extended in front as shown in Fig. 88.

Process.—Turn towards the Right with a semicircular movement of the arms, and assume position as shown in Fig. 89, breathing in full during the movement. Return to the original position Fig. 88, and breathe out.

Turn towards the left with a similar movement, breathing in when making the turn, and assume position as in Fig. 89(a). Return to the original position as in Fig. 88, breathing out during the movement.



Fig. 89

EXERCISE No. 32(a)



Fig 89(a)

Position.—Sit on the floor as shown in Fig. 89.

Process.—Turn quickly to the left with a full semicircular movement, and assume position as in Fig. 89(a), breathing in full during the movement. Return to the original position as in Fig. 89, breathing out during the movement.

Repeat as many times required.

EXERCISE No. 32(b)

Position.—Sit on the floor, and assume position as shown in Fig. 89(a).

Process.—Turn quickly to the right, and breathing in full during the movement, assume position as in Fig. 89. Return to the original position as in Fig. 89(a), breathing out.

Repeat as many times required.

EXERCISE No. 33

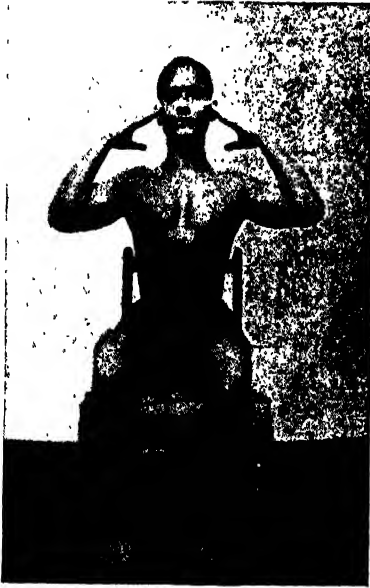


Fig. 90



Fig. 91

Position.—Sit on an armless chair or a stool, with the tips of the middle and the fore fingers of the right and the Left hands touching the right and the Left temples respectively as shown in Fig. 90.

Process.—Breathe in full, and assume position as shown in Fig. 91. Breathe out, and assume position as shown in Fig. 90.

Repeat as many times required.

EXERCISE No. 34



Fig. 92



Fig. 93

Position.—Sit erect on a chair, with your arms raised above the head as shown in Fig. 92, and take in full breath.

Process.—Bend your trunk towards the right, and assume position as shown in Fig 93, breathing out during the movement. Regain the original position as shown in Fig. 92, breathing in full.

Repeat.

Try the same process on the left side, and assume position as shown in Fig. 93(a), breathing out during the movement.

Repeat as many times as required.

EXERCISE No. 34(a)



Fig. 93(a)

Position.—Take position as in Fig. 93.

Process.—(a) Turn towards the left, and assume position as in Fig. 93(a), breathing in full during the movement, having a sort of heaving (expansile) movement of the chest opposite (right) side. Return to the original position as in Fig. 93.

Repeat as many times as required.

(b) Repeat the same process on the opposite side, and so on.

When bending on the left side the heaving will be seen on the right side of the chest. While bending on the right side, the heaving will be seen on the left.

EXERCISE No. 35



Fig. 94



Fig. 95

Position.—Sit erect on a chair (armless), with your elbows away from the body, the dorsal surface of the distal halves of the four fingers of both hands right and left, touching the outer and upper third and front of the right and left thighs respectively as shown in Fig. 94.

Process.—Breathe in full, and assume position (the tips of the fingers only touching the thigh) as in Fig. 95. Breathe out and assume the original position as in Fig. 94.

Repeat, as many times as required.

EXERCISE No. 36



Fig. 96



Fig. 97

Position.—Sit erect on an armless chair, as shown in Fig. 96. and take in full breath.

Process.—Close both elbows towards the middle line of the body in front, breathing out during the process, and assume position as shown in Fig. 97. Regain the original position as in Fig. 96, breathing in full during the process.

Repeat as many times required.

EXERCISE No. 37



Fig. 98



Fig. 9

Position.—Stand erect with the arms hanging, and the palms of the hands touching the outer side of the thighs as shown in Fig. 10 (Ex. No. 5), and breathe out.

Process.—Bend your body towards the right breathing slowly (for two seconds), during the movement; making the utmost expansion of the left side of the chest, and assume position as in Fig. 98. Quickly return to your original position Fig. 10. breathing out during the procedure.

Repeat as many times required.

EXERCISE No. 37(a)

Position.—Stand erect as in Fig. 10, and breathe out.

Process.—Bend your body towards the left, breathing in for two seconds as in Exercise No. 37, making the utmost expansion possible of the right side of the chest, and assume position as in Fig. 99. Return to the original position Fig. 10, breathing out during the movement.

Repeat.

EXERCISE No. 37(b)

Position.—Stand bending towards the right as shown in Fig. 98—breathing out.

Process.—Bend towards the left, and assume position as in Fig. 99, breathing in during the process. Return to the original position as in Fig. 98, and breathe out. Repeat.

Repeat the same process bending towards the right side, for as many times as required.

EXERCISE No. 38

**Fig. 100****Fig. 100(a)****Fig. 101****Fig. 101(a)**

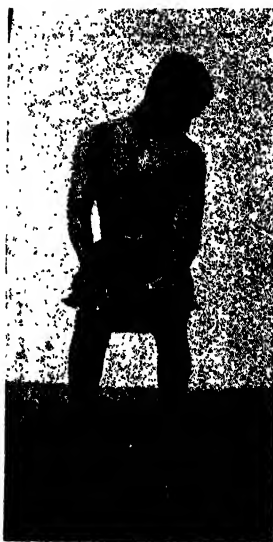


Fig. 102.

Position.—Sit on an armless chair with the hands on the knees, the face turned towards the right, and the chin touching the right Clavicle as shown in Fig. 100, also breathe out,

Process.—Make a twisting movement of the neck, assuming the different positions as shown in Figs. 100(a), 101, 101(a) and 102. Breathing (time taken two seconds) in full when assuming positions as in Figs. 100(a) and 101; and then breathing out when your chin touches the left Clavicle, and you assume positions as in Figs. 101(a) and 102 respectively. Make a return twisting movement towards the right, and assume positions as in Figs. 101(a), 101, 100(a) and 100. The chin now touches the right Clavicle, breathe in full for (two seconds) during the procedure when assume Figs. 101(a), 101, and breathe out as soon as your chin touches the right Clavicle. Repeat movements alternately as many times required,

EXERCISE No. 39



Fig. 103



Fig. 104

Position.—Sit erect on an armless chair with the palm of the hands resting on the knees, and the chin touching the chest as shown in Fig. 103.

Process.—Breathe in full slowly (time covering three seconds), and assume position as shown in Fig. 104, by throwing the head backwards. Assume the original position by a forward movement of the head, and the chin touching the chest. Breathe out during the movement.

Repeat.

No. of movements.—10 to 200.

EXERCISE No. 40



Fig 105



Fig. 106

Position.—Stand with your hands folded behind the head, the trunk bent at right angles, with the legs as shown in Fig. 105, and breathe out.

Process.—Now with a slow movement upwards assume position as in Fig. 106, breathing in full during the process. Regain the original position Fig. 105, and breathe out.

Repeat.

EXERCISE No. 41



Fig. 107

Position.—Lie on a bench, or on the floor with a pillow under your back, the arms lying on the sides parallel with the body, also the palm of the hands facing towards the ground, as shown in Fig. 107.

Process.—Raise your arms above head slowly and simultaneously, making a semi-circular curve, and assume position as in Fig. 108. Breathe in full (for 2 seconds) during the process. Return to the original position Fig 107, breathing out (for one second) during the process.

Repeat as many times required.

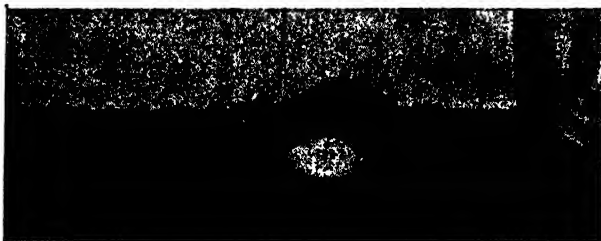


Fig. 108

EXERCISE No. 42



Fig. 109

Position.—Lie on the floor on your back with the arms resting parallel to the body as shown in Fig. 109.

Process.—Raise legs right and left alternately, putting them at right angles to the trunk as shown in Figs. 109(a) and 109(b). Breathe out when raising the leg, and breathe in when lowering it.

Repeat.

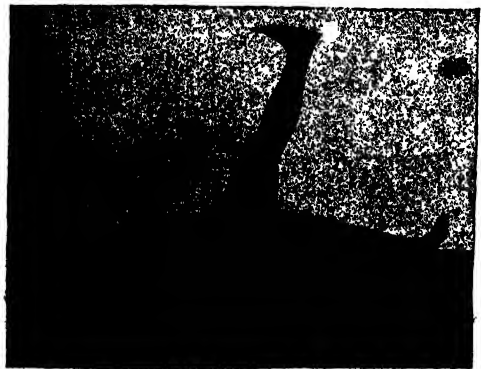


Fig. 109(a)

EXERCISE No. 42(a)



Fig. 109(b)

Position.—Lie on the floor as shown in Fig. 109.

Process.—Raise both legs simultaneously, putting them at right angles to the trunk as shown in Fig. 109(c). Breathe out when raising legs, and breathe in when lowering them.

Repeat.



Fig. 109(c)

EXERCISE No. 43

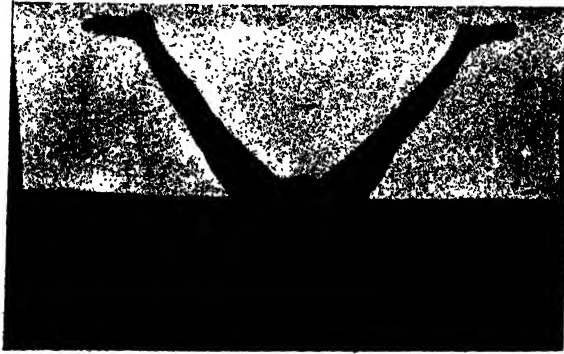


Fig. 110

Position.—Lie on your back on the floor. Lift both legs, and assume position as shown in Fig. 79.

Process.—Extend both legs, and assume position as shown in Fig. 110, breathing in during the process. Breathe out, and assume the original position as in Fig. 79.

Repeat as many times required.

✓ EXERCISE No. 44



Fig. 111

Position.—Stand erect with the arms extended and with folding palms in front as shown in Fig. 111.

Process.—Breathe in full, and push the extended arms backwards as far as you can, keeping the arms on a horizontal level, and assume position as shown in Fig. 112. Breathe out, and return to the original position as in Fig. 111.

Repeat.



Fig. 112

EXERCISE No. 45



Fig. 113



Fig. 114



Fig. 115

Position.—Stand erect with the arms dropped, and the palm of the hands touching the outer side of the thigh as shown in Fig. 113.

Process.—Take in full breath, raise arms, and assume position as in Figs. 114 and 115 consecutively (time one second for each movement). Start breathing out, dropping the arms, and assuming positions as shown in Figs. 114 and 113 (the original position)—(time taken one second for each movement).

The Figs. 113, 114 and 115 will cover the first movement ; and the breathing will be full during the movement. While the movements proceeding in a reverse way, and covering the Figs. 115, 114 and 113, will complete the exercise with breathing out.

EXERCISE No. 46



Fig. 116



Fig. 117

Position.—Stand erect with the arms hanging by the sides as shown in Fig. 116.

Process.—Raise both arms (extended) simultaneously above head, making a circular movement in front, and assume position as in Fig. 117, breathing in during the process. Continue the circular movement backwards making a complete circle with each arm, and regain the original position as in Fig. 116. Breathe out when changing positions (from Fig 117 back of the original position Fig. 116).

Repeat,

EXERCISE No. 46(a)

Position.—As in Exercise No. 46.

Process.—Proceed with movement of the arms in a reverse way *ie.*, assuming positions Figs. 116, and proceeding to Fig. 117 and back to Fig. 116. Breathing in when assuming position as in Fig. 117. breathing out when completing the circular movement, and reassuming the original position Fig. 116.

Repeat.

EXERCISE No. 47



Fig. 118



Fig. 119

Position.—Sit on a stool, keep the upper arms fixed to the sides, and with bent elbows assume position as shown in Fig. 118.

Process.—Make a circular movement of both the forearms, with the hands of a watch on the right side, and against the hands of a watch on the left as shown by dotted lines and arrows in Fig. 119.

Repeat.

EXERCISE No. 47(a)



Fig. 120



Fig. 120(a)

Position.—Sit on a stool, keep the upper arms fixed to the sides and the forearms supinated as shown in Fig. 120.

Process.—Proceed with the movement of the fore-arms in a reverse way *ie.*, against the hands of a watch on the right side, and with the hands of a watch on the left, as shown by the dotted lines and arrows in Fig. 120(a)—keeping the upper arm always fixed to the side of the chest.

Repeat.

EXERCISE No. 48



Fig. 121



Fig. 122

Position.—Stand erect with the arms extended at the shoulder level, and the palmer surface of the hands facing downwards. Make the right also the left hands formed into fists as shown in Fig. 121.

Process.—Extend the hands on the wrist and assume position as in Fig. 122. Flex the hands, and assume the original position as in Fig. 121.

Try these extension and flexion movements simultaneously also alternately.

Repeat.

EXERCISE No. 49



Fig. 123



Fig. 124

Position.—Stand with the arms extended and the hands made into fists as shown in Fig. 123 (without arrows and dotted lines).

Process.—Rotate the fists on the wrist simultaneously, making circles inwards (as shown by arrows and dotted lines) in Fig. 123 ; and outwards (as shown by arrows and dotted lines) in Fig. 124.

Repeat.

EXERCISE No. 50



Fig. 125



Fig. 126

Position.—Stand erect with the hands made into fists, and the arms extended also supinated as shown in Fig. 125.

Process.—Rotate the hands forwards causing the palm of the hands facing downwards (pronation), as shown in Fig. 126. Assume the original position as in Fig. 125 by rotating the hands backwards *i.e.*, the palm of the hand facing upwards (supination). Do this rotation work in both hands simultaneously pronating and supinating.

Repeat.

EXERCISE No. 51



Fig. 127



Fig. 128



Fig. 129

Position.—Stand erect, holding the back rest of a chair with one hand while the other hand placed on the waist as shown in Fig. 127.

Process.—Extend, and flex the knee of one leg alternately as shown in Figs. 128 (extension) and Fig. 129 (flexion).

Repeat as many times required.

Repeat similar movements on the other leg, in a similar way.

EXERCISE No. 52



Fig. 130

Position.—Sit on a chair or a stool as shown in Fig. 130.



Fig. 131



Fig. 132

Process.—Move the affected foot upwards and downwards alternately as shown in Figs. 131 and 132. Number of movements (1 to 25).

EXERCISE No. 52(a)



Fig. 133

Position.—Sit on a chair as shown in Fig. 130.

Process.—Rotate the foot (affected) circularly outwards as shown in Figs. 132, 131, and 133.

EXERCISE No. 52(b)

Process.—Repeat the process as shown in Exercise No. 52(a) but in a reverse way.

EXERCISE No. 53



Fig. 134



Fig. 134(a)

Position.—Sit on a chair with a weight (1 to 5 lbs) tied round the affected foot with a strap as shown in Fig. 134.

Process.—Attempt lifting the weight by extension of the foot as shown in Fig. 134(a) and lower it to assume the original position as in Fig. 134.

Repeat.

EXERCISE No. 54



Fig. 135



Fig. 136

Position.—Sit on a stool as shown in Fig. 130. Extend the legs alternately as shown in Fig. 135, and simultaneously as shown in Fig. 136. The extension should be complete as shown in Fig. 136, and the legs will return to the original position as shown in Fig. 130. No. of movements (3 to 50).

EXERCISE No. 54(a)

Position.—Sit on a stool as shown in Fig. 130, but with a weight tied at the ankle or at the foot; the weight being (1 lb. to 10 lbs. as necessary).

Process.—Extend the leg or legs alternately or simultaneously as described in Exercise No. 54.

EXERCISE No. 55



Fig. 137



Fig. 138

Position.—Stand erect as in Fig. 137. Keep the feet about 12 inches apart.

Process.—Raise arms to the shoulder level horizontally, and bend the knees along with the movement, putting the weight of the body on the toes, and raising the heels as shown in Fig. 138. Get up, and assume position as in Fig. 137. Breathe in when bending the knees and raising the arms. Breathe out when getting up.

No. of movements (3 to 50).

EXERCISE No. 56



Fig. 139



Fig. 139(a)



Fig. 140

Position.—Stand erect holding a rope with both hands, and assume position as in Fig. 139, with the knees held by a masseur—the right by the right hand and the left by the left.

Process.—Make deep knee bends slowly (the masseur pulling uniformly as well as steadily the knees away from the middle line of your body, during the knee bending movement), and assume positions as shown in Figs. 139(*a*) and 140. Get up slowly, and regain the original position Fig. 139. The masseur relieves the pull slowly when you get up.

Repeat.

EXERCISES

EXERCISE No. 57



Fig. 141



Fig. 141(a)



Fig. 142

Position.—Stand erect with the arms hanging down as in Fig. 141.

Process.—Raise the arms outwards and upwards until the upper arms attain the horizontal level Fig. 141(*a*) ; then bend the forearms, and make the thumbs (of each hand) touch the temple on each side as shown in Fig. 142. Bring back the arms down to the original position as shown in Fig. 141. No breathing restriction is necessary.

Repeat.

EXERCISE No. 58



Fig. 143



Fig. 144

Position.—Stand erect with the arms hanging down, the fingers of the hand half-flexed, and pressed in front of the thigh as shown in Fig. 143.

Process.—Raise both arms as shown in Fig. 144. breathing in during the process. Bring the arms down, assume the original position Fig. 143, and breathe out.

Repeat.

EXERCISE No. 59



Fig. 145



Fig. 146



Fig. 147

Position.—Stand erect with the arms hanging in a position as shown in Fig. 145.

Process.—Raise both arms simultaneously forwards, keeping them parallel to each other, and assume position as in Fig. 146, and then above the head as shown in Fig. 147. Bring both arms gradually down as in Fig. 146, and then to the original position Fig. 145, breathing in when raising the arms, and breathing out when lowering them.

Repeat.

EXERCISE No. 60



Fig. 148

Position.—Lie on your back on a bench, the legs of which towards your feet raised, so as to make the outer angle of 60° (the legs at the head with the ground). Hold an iron rod ($1\frac{1}{2}$ foot long and 1 inch in diameter) with both hands, and place it on the front of your thighs as shown in Fig. 148.



Fig. 149

Process.—Raise the rod at arms length above head, with a *semicircular* movement in front, and assume position as shown in Fig. 149. Breathing in full during the process. Lower the rod, assume the original position as in Fig. 148, and breathe out.

Repeat as many times required.

EXERCISE No. 61



Fig. 150

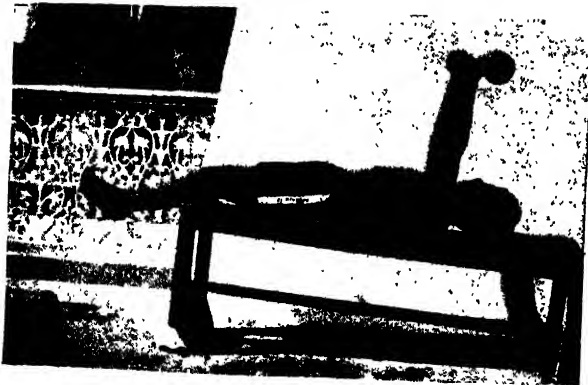


Fig. 151

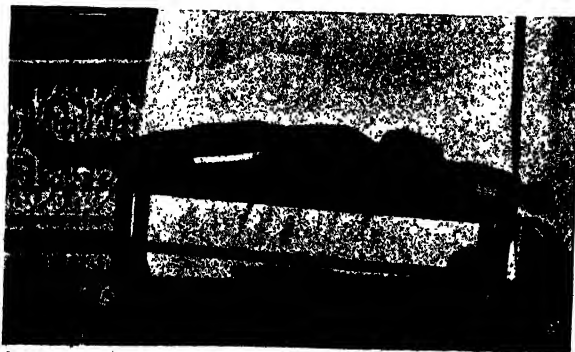


Fig. 152

Position.—

Assume position holding a bar-bell as shown in Fig. 150. (The legs of the bench towards your feet raised as in exercise No. 60).

Process.—

Imitate the movement exactly as in Exercise No. 60, and assume positions as in Figs. 151 and 152, breathing in full. Regain the original position Fig. 150, and breathe out.

Repeat.

The weight of the bar-bell (5 lbs. to 10 lbs.).

EXERCISE No. 62



Fig. 153

Position.—Lie on your back, holding a rope hanging from the ceiling as shown in Fig. 153.

Process.—Bend your trunk, and assume positions as in Figs. 154 and 155 consecutively, putting the body weight on the

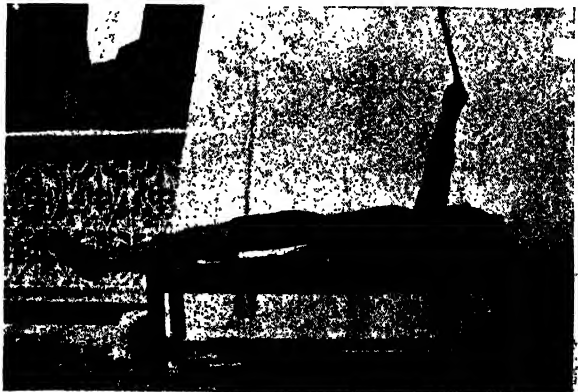


Fig. 154

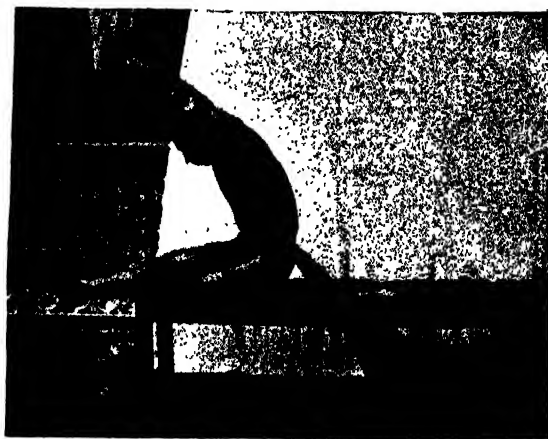


Fig. 155

rope as much as necessary. Breathe out during the process. Regain the original position as in Fig. 153, and breathe in full.

Repeat.

EXERCISE No. 63



Fig. 156



Fig. 157

Position.—Stand erect as in Fig. 156. The masseur supports your trunk, holding you from behind.

Process.—Bend your knees and assume position as in Fig. 157. Try to regain the original position as in Fig. 156. The masseur should help you in the process of getting up. Gradually when you improve in strength of your legs, the masseur should apply less and less strength in helping you in the process.

Repeat.

EXERCISE No. 64



Fig. 158



Fig. 159



Fig. 160

Position.—Stand erect, holding an iron rod (wt. 2 lbs. to 5 lbs.), with the arms, extended in front as shown in Fig. 158, breathing out when taking the position.

Process.—Turn towards the right with a semicircular movement of the arms, and assume position as shown in Fig. 159, breathing in full during the movement. Return to the original position Fig. 158, and breathe out. Turn towards the left with a similar movement and assume position as in Fig. 160, and breathing in during the process. Return to the original position Fig. 158, and breathe out.

Repeat as many times required.

EXERCISE No. 64(a)

Position.—Stand erect, assuming position as shown in Fig. 159, and breathe out.

Process.—Turn towards the left with a semicircular movement of the arms, and assume position as shown in Fig. 160, breathing in full during the movement. Make a similar movement towards the right, and assume position as in Fig. 159, breathing out.

Repeat the process alternately right and left as many times required.

EXERCISE No. 65

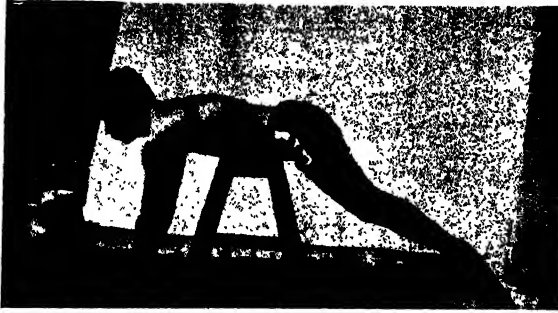


Fig. 161

Position.—Assume position as in Fig. 161, and breathe out.

Process.—Contract your abdominal muscles, and assume position as in Fig. 162. Breathe in and out three times while remaining in that position. Return to your original position as in Fig. 161, and breathe in normally.

Repeat.

Number of movements (3 to 25).

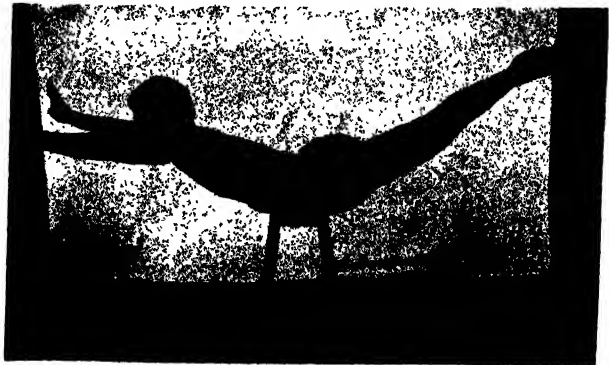
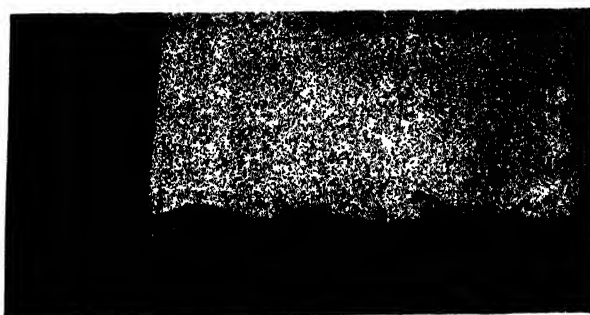


Fig 162

EXERCISE No 66

**Fig. 163**

Position.—Lie on your face on the floor, with your knees tied together (having a pad 2" to 3" thick, placed in between them), and the feet tied closely together at the ankle, with a strap as shown in Fig. 163.

Process.—Flex both legs on the thigh, and assume position as shown in Fig. 164.

Repeat the movements as many times required.

**Fig. 164**

EXERCISE No. 67

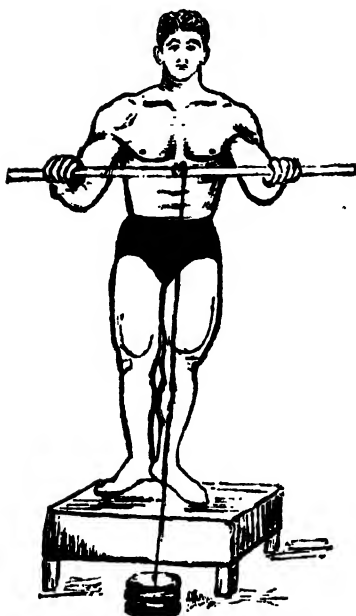


Fig. 165

Position.—Take a round stick *e.g.*, a wooden screen rod, suspend a weight (5 lbs) tied at one end of a cord, while the other end of the cord passed through a hole pierced through the centre of the rod and tied round it.

Process.—Now stand on a chair or a stool as shown in Fig. 165—holding the rod chest high in front. Roll the rod round and round with both hands, winding up the cord. Continue until the weight is wound close up, and then unwind to full length of the cord. Continue the process till the fingers are tired.

EXERCISE No. 68

Position.—Same as in exercise No. 67, holding the rod ; but the windings and unwindings to be done in the reverse way, till the fingers get tired.

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